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WHEAT-PEA FARMING

in Washington and Idaho, 1935-53

farm costs and returns

Circular No. 954

U. S. DEPARTMENT OF AGRICULTURE
Washington, D. C.

Contents

	Page
Summary	iv
Introduction	1
Wheat-pea areas	1
Sources of data	3
Size of farms	4
Classification of farms by size	4
Changes in farm size	4
Farm organization	5
Land use	5
The livestock enterprises	7
Variation in farm organization and crop yields by size of farm	8
Farm income and expense	8
Commercial nature of wheat-pea farming	9
Variation in farm income by size of farm	11
Income factors	11
Crops and livestock	11
Crop income	12
Economic motivation	14
Valuation and composition of farm assets	16
Physical assets	17
Equipment per crop acre by size of farm	18
Price of capital items	19
Farm expenses	20
Prices paid for production items	20
Changes in specific production items	22
Power and machinery costs	24
Tractor costs	25
Combine costs	27
Other farm machinery costs	27
Truck costs	28
Automobile costs	28
Allocation of net farm income	28
Charge for capital	28
Return to operator and family for labor and management	29
Production and inputs	30
Appendix	32
Terms used	32
Additional tables	34
Similar publications for other areas	42

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Summary

The wheat-pea areas of Washington, Idaho, and Oregon produce annually from 20 to 30 million bushels of wheat. They produce about 80 percent of the dry edible peas and about 25 percent of the canning peas grown in this country. Other harvested crops include barley, oats, and hay.

Acreages of wheat and of peas in the area are flexible. When income from an acre of wheat is high relative to income from an acre of peas or other crops, acreage of wheat expands. When income from peas is relatively high, acreage of peas expands at the expense of wheat. Peas also replace some of the fallow land, particularly if the price of peas is high relative to the cost of operating machinery and hiring labor.

Wheat-pea farms averaged 390 acres in 1935 and 510 acres in 1953. This growth of 7 acres per year was accompanied by a 25-percent decrease in number of farms. The quantity of machinery and equipment per crop acre nearly doubled between 1935 and 1953. During this time acres per farm increased by a third but labor used per farm decreased by 23 percent.

Between 1935 and 1953 many changes occurred in methods of farming. As examples, diesel tractors replaced gas tractors; the combining of peas replaced mowing and raking; bulk-handling replaced bagging of grain and peas; use of sweet clover for green manure became standard practice; use of 2, 4–D and DDT for weed and insect control was introduced; and use of nitrate fertilizer increased from none to 2.75 tons of elemental nitrogen per farm.

Gross production per year from 1949 through 1953 was 40 percent greater than in 1935–39. Close to half of this increase was due to increased efficiency. Methods used in farming change gradually and a part of the increased outlay for machinery meant economy in labor. Changes in production from one year to the next are largely due to variation in crop yields; for the most part they are independent of farm costs. However, variations in crop yields are not as great here as in some other areas.

Income levels in this area are high; they have increased greatly in the last 19 years. Gross income on a typical commercial farm would be about $20,000 at 1953 prices and 1935–53 average yields, as compared to an average income of $5,400 in 1935–39. In 1953 farm expenses averaged $10,000 as contrasted with $3,000 in 1935–39. Gross income varies more from year to year than does farm expense.

Capital needed to own and operate a farm in the area has increased rapidly. Average value of farm assets was $26,000 in 1935 and $135,000 in 1953. Around 22 percent of this increase was due to the increase in size of farm and in quantity of machinery. The other 78 percent was due to the increase in prices, and especially to the increase in the price of land. Real estate comprised between 75 and 85 percent of the value of all assets. In 1953 the price of land was four times its 1935 price. This rapid increase indicates a profitable agriculture. As farm profits increase they tend to be capitalized into higher land values.

Use of invested capital has increased relative to use of the operator's labor and other direct costs. As capital requirements increase the extent of possible capital losses that are due to price declines also increases. These losses become more serious to the extent that the investment is made with borrowed funds.

WHEAT-PEA FARMING

in Washington and Idaho, 1935-53

. . . farm costs and returns

by Edgar B. Hurd, Agricultural Economist [1]
Production Economics Research Branch
Agricultural Research Service

Introduction

In the wheat-dry pea area of Washington and Idaho (the Palouse area), the factors that affect farm income are those that affect farmers everywhere—farm expenses, size of farm, use of land, crop yields, capital available, progress of mechanization, and farm prices. This report is intended to present a summary of farm conditions in the area from 1935 to 1953 and the discussion is mainly of the items listed.[2]

Most of the operators who were farming in the Palouse area in 1953 were also farming there in 1935. This report, therefore, is largely a record of their achievements.

As a historical study of the forces that determine or shape the agriculture of the area, this report is expected to be useful in measuring the effects of past agricultural developments and in providing background information for formulation of future agricultural policy. The financial information provided will be useful to prospective farm owners, lending agencies, extension workers, and others concerned with the economy of the area.

Wheat-Pea Areas[3]

This report is based primarily upon the Palouse area (fig. 1). This area contains a million acres. It is bounded on the east by the

[1] Assistance and cooperation of the Washington and Idaho Agricultural Experiment Stations is acknowledged. Washington State College has published two phases of this study. The first phase was presented in FARM SIZE AND LAND USE IN THE WHEAT-PEA AREA OF WASHINGTON AND IDAHO, 1935-50. Wash. Agr. Expt. Sta. Cir. 169. 1951. The second phase was presented in GROSS FARM INCOME IN THE WHEAT-PEA AREA OF WASHINGTON AND IDAHO, 1935-50. Wash. Agr. Expt. Sta. Cir. 213. 1953.

[2] This report is part of a nationwide study of commercial farms and ranches by types and sizes in important farming regions of the United States, conducted by the Production Economics Research Branch, Agricultural Research Service, under the supervision of Wylie D. Goodsell. Objectives, methodology, procedure, and terms used in these studies are comparable. A list of publications covering some of the studies is included in the appendix.

[3] For a more complete description of the physical features of the wheat-pea areas see: PUBOLS, BEN H., ORR, ALDEN E., AND HEISIG, CARL P. FARMING SYSTEMS AND PRACTICES AND THEIR RELATIONSHIP TO SOIL CONSERVATION AND FARM INCOME IN THE WHEAT REGION OF WASHINGTON. Wash. Agr. Expt. Sta. Bul. 374. 1939.

Moscow mountain forest area of northern Idaho; on the west by a wheat-summer fallow area of western Whitman County, Wash.; on the north by the grasslands of Spokane County, Wash.; and on the south by the "breaks" of the Snake and Clear Water Rivers. The area extends approximately 80 miles from north to south and 25 miles from east to west.

Most of the Palouse area lies at an elevation of 2,000 to 2,500 feet and has an annual average precipitation of 18 to 25 inches. Topography ranges from rolling to hilly. The typical hill has a gentle south to southwest slope, and a steep north to northeast slope often amphitheatre in form.

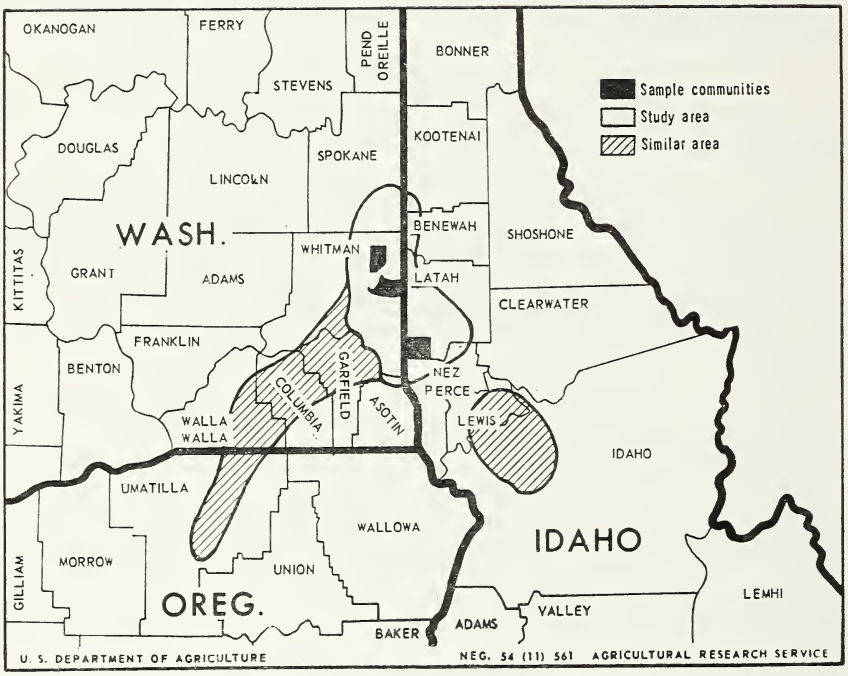

FIGURE 1.—Wheat-pea areas of Pacific Northwest: Communities studied, areas to which findings generally apply, and areas to which findings apply to some extent.

The eastern boundary of the area is about at timberline and has the greatest amount of rain—25 inches. The western boundary has the lowest elevation and the smallest amount of rain—18 inches. As is common on the west coast, precipitation is lightest in summer. The last heavy spring rain in the area usually comes soon after June 1. Dry summers with hot days and cool nights are typical.

The growing season extends for 150 days. Winter wheat grows moderately after the first killing frost in the fall and before the last killing frost in the spring. Fieldwork starts usually about April 15 and ends October 1. Ordinarily, it is too wet for fieldwork at other times. Soils of the area are mainly deep silt loams developed from loessial material and underlain with basalt. They retain moisture; they are free from rocks and are relatively well supplied with essential minerals.

South of the Snake River in Washington and Oregon and east of the Snake River, south of Lewiston, Idaho, are other lands similar in most respects to the Palouse.[4] This land extends around the base of the Blue Mountains in Washington and into Umatilla County in Oregon. It also includes the farming area around Grangeville, Idaho. The major difference between this land south of the Palouse and the Palouse itself is in the type of peas produced. The Blue Mountain area produces canning rather than dry field peas and the Grangeville area produces Austrian winter peas and some grass seed not usually produced in other wheat-pea areas.

The Palouse area proper produces about 80 percent of the dry edible peas grown in this country, and the canning-pea areas to the south of the Palouse produce about 25 percent of the United States pack of canned peas. The Palouse and adjacent pea-producing areas harvest annually between 20 and 30 million bushels of wheat. These areas have about 3,300 commercial farms and around 1.7 million acres of farmland.

Land use in wheat-pea areas of Washington, Idaho, and Oregon, 1953 is shown below:

Land use [1]	*1,000 acres*
Wheat	846
Peas (dry) including lentils	160
Peas (canning)	90
Oats and barley	110
Hay (mostly alfalfa)	56
Green manure crops	56
Other summer fallow	247
Cropland pasture	29
Nontillable land, roads, building grounds	106
Total land	1,700

[1] Estimated. Based on local farm surveys and State statistics of Agricultural Marketing Service, U. S. D. A.

The proportion of land used for a given purpose varies from year to year and from farm to farm in a given year. But since the date of settlement the land use has been limited to the crops and other uses mentioned. Wheat has been the chief crop since the advent of the railroads. Dry peas have been an important crop in parts of the Palouse since 1900. Canning peas and sweet clover for green manure have been important since 1935.

Sources of Data

Data for the study reported here were obtained for the most part either directly or indirectly from the Palouse area. However, the conclusions should apply generally to all wheat-pea areas in Washington, Idaho, and Oregon because of similarities in type of farming and basic conditions.

Annual data were obtained from Commodity Stabilization Service, formerly Production and Marketing Administration, records on individual farms obtained from sample communities (fig. 1), county assessor and treasurer records on individual farms, crop and livestock correspondent records of the Agricultural Marketing Service, farm-management survey records obtained by State colleges in cooperation with the Production Economics Research Branch, Agricultural

[4] See Bureau of Agricultural Economics. generalized types of farming in the united states. U. S. Dept. Agr., Agr. Inform. Bul. 3. 1950.

Research Service, local merchants and cooperative marketing agencies, the many agricultural statistics compiled by the Agricultural Marketing Service and other agencies of the United States Department of Agriculture, and the United States Census of Agriculture.

Size of Farms

All farms in the Palouse area that have at least 100 acres of cropland were included in the study reported here. About 1 percent of the land is held in units below this size and these are almost entirely noncommercial farms. Except for some of the larger farms, each farm in the area is managed by one family. The latter are operated by multiple family units which usually consist of brothers or father and sons. Reference is made to differences by size of farm when these differences are important. Most of the analysis is concerned with the average of all farms having 100 acres or more of cropland. This average is representative of typical family-operated farms.

Classification of Farms by Size

Farm sizes in the area vary almost continuously from 100 to 2,000 acres and the more common sizes tend to be 160 acres or multiples thereof. This reflects the settlement pattern in vogue three generations ago. Most homesteads have been combined into half-section, section, and larger farms. Many of them have not changed their original boundaries. A few have added 40-acre tracts. Others have been reshaped to conform to natural topographic conditions. Some of the original quarter-section units contain more or less than 160 acres because of variation in the Government survey. More total land is operated in section units than any other size, but more farmers operate half-sections.

Consolidation of land into farming units frequently occurs because an operator acquires noncontiguous tracts. Some of the larger farms have widely scattered tracts of land.

In the study commercial farms were classified into three size groups as follows:

1. Small—one-third of all farms with the least cropland.
2. Large—largest farms having one-third of the cropland.
3. Bulk-line—intermediate in size between small and large. The term "bulk-line" is used for the middle group because the limits of the group in any year encompass approximately half of the farms and half of the land.[5]

Changes in Farm Size

The average wheat-pea farm expanded from about 390 acres in 1935 to a little more than 510 acres in 1953, or about 7 acres per year. This growth represents a reduction of 25 percent in number of farms in 19 years. Most of the decrease occurred through consolidation of small and medium-sized farms rather than through consolidation of two large farms or even of a large with a medium farm. Between 1935 and 1953 average small and bulk-line farms increased in size about 37 percent, whereas large farms increased only about 7 percent.

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[5] See Hurd, Edgar B., and Brough, O. L., Jr., farm size and land use in the wheat-pea area of washington and idaho, 1935–50. Wash. Agr. Expt. Sta. Cir. 169. 1951.

The increase in size of small and bulk-line farms is due to the greater economy in use of labor and machinery as farm size increases. But the relatively slow rate of growth among the large farms suggests that the advantage of additional size is limited.

Farm Organization

Land Use

The cropping system may be divided into three categories: (1) Grain, mainly wheat; (2) peas and summer fallow; and (3) soil-conserving crops (table 1). A common 2-year crop rotation consists of winter wheat one year followed by peas or summer fallow the next. Occasionally spring wheat, barley, or oats is grown in the rotation after winter wheat. Based on the period 1935–53, the average crop acre in the Palouse area was used approximately as follows:

Crop	*Percent of time*
Wheat	40
Peas or summer fallow	40
Oats and barley	10
Soil-conserving	10

TABLE 1.—*Land use on commercial wheat-pea farms, Washington and Idaho, selected years 1935–53*

Item	1935	1939	1943	1948	1952	1953 [1]
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Acreage per farm	389	421	440	474	507	512
Cropland— Harvested area:[2]	Percentage of land area					
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Winter wheat	35	31	12	35	44	42
Abandonment	2	1	3	1	([3])	1
Net winter wheat	33	30	9	34	44	41
Spring wheat	4	4	10	4	4	7
Oats	5	6	4	1	2	2
Barley	2	3	3	6	6	5
Peas	17	13	44	18	9	12
All hay	5	6	4	3	3	4
Total harvested	66	62	74	66	68	71
Cropland pasture	1	4	3	2	2	2
Green manure	2	12	7	5	4	4
Summer fallow	24	15	9	20	19	16
Total cropland	93	93	93	93	93	93
Other land	7	7	7	7	7	7
Total farmland	100	100	100	100	100	100

[1] Preliminary.
[2] See explanation of cropland harvested in appendix.
[3] Less than 0.5 of 1 percent.

These proportions vary from farm to farm in any one year, depending on the land and the farmers. They also vary from year to year with changing prices and income prospects (fig. 2).

Oats are grown to advantage on the wetter lands. Some smaller fields located in low spots may be kept in oats a higher percentage of the time than on the more typical higher and drier lands. Oats were more in demand as a feed grain for horses before the advent of tractors. Numbers of draft horses have declined until they are now practically nonexistent in the area. Prior to 1940, the acreage of oats exceeded that of barley. But since 1940, the reverse has been true and the trend in acreage of oats has been downward.

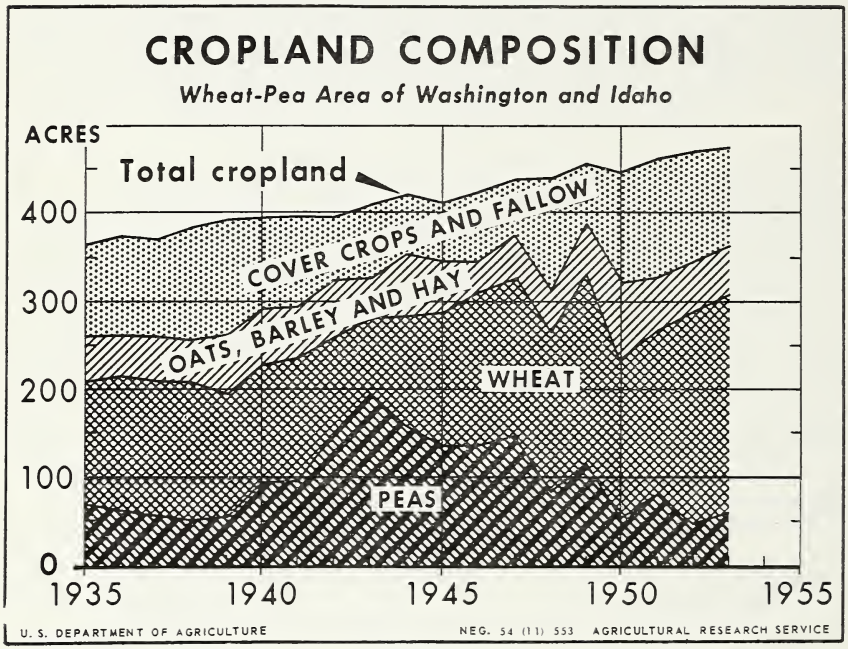

FIGURE 2.—Total cropland measures size of farm, harvested acres reflect production, and the area of each crop varies with changing economic conditions.

Barley is usually a second choice to wheat. When the acreage of wheat is restricted because of allotments, barley is planted on most of the diverted acres. Oats and barley are usually considered feed crops, while wheat is considered a bread grain. This classification is only partly correct. In the Palouse area more than half of the grain fed to livestock in most years is wheat. This is done because the average crop acre in the area produces more pounds of livestock feed when planted to winter wheat than when planted to other grains. Each type of grain is approximately equal pound for pound in feeding value. The 19-year average yield for each of the four grains is as follows:

	Pounds per acre	*Bushels per acre*
Winter wheat	1, 896	31. 6
Barley	1, 670	34. 8
Spring wheat	1, 506	25. 1
Oats	1, 331	41. 6

In addition to larger yields, wheat usually sells for more per pound than other grains. As a result, winter wheat is planted on more productive land and the yield statistics cited above are not strictly comparable.

Land in winter wheat that is abandoned is planted mainly to spring wheat. Even in years when winter wheat killing is severe, only patches are killed. When these patches are planted to spring wheat the entire crop (both winter and spring) can be harvested as a unit at a considerable saving. In years when acreage of winter wheat planted appreciably exceeds that harvested, acreage in spring wheat is high.

Ordinarily, peas compete directly with summer fallow. But from 1942 to 1944, when demand and price for peas were high, peas not only replaced much summer fallow, they also replaced wheat. For many farmers this was done by growing peas 2, 3, and, in extreme cases, 4 years in succession.

Soil-conserving crops in this area consist of alfalfa hay, sweet clover for green manure, and cropland grasses. Production of hay is usually kept in reasonable balance with livestock numbers. Some interfarm sales of hay are made. Operators of small farms frequently buy hay from operators of larger farms.

Sweetclover is planted with peas or barley to be plowed under the following spring as a green-manure crop. The land is summer-fallowed the rest of the season and planted to winter wheat in the fall.

Cropland grasses are established along watercourses where gullies would tend to form and also in borderline areas between cropland and grazing land. The acreage in this category, although it varies with the presence or absence of an allotment program has never amounted to more than 5 percent of the farm area.

About 7 percent of the farmland is range or nontillable grazing land. Productivity per acre is slight. Farms near or adjacent to rivers tend to have more nontillable land than do other farms.

The Livestock Enterprises

Livestock enterprises consist of milk cows kept mainly to supply dairy products for the farm family, a small flock of chickens, usually less than 100 birds, a beef-cattle enterprise to utilize rangelands, and a small hog enterprise (table 2).

TABLE 2.—*Livestock on commercial wheat-pea farms, Washington and Idaho, selected years 1935–53*

Item	1935	1939	1943	1948	1952	1953 [1]
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
On hand January 1:						
Draft horses	7	3	2	1	0	0
Milk cows	3	3	3	2	2	2
Beef cows	2	3	5	3	4	5
Other cattle	7	8	12	4	6	7
Hens and pullets	78	87	96	55	53	62
Other chickens	9	10	11	19	18	13
Pigs raised	18	32	44	10	12	6
Chickens raised	78	88	125	99	90	98

[1] Preliminary.

In times of economic stress numbers of milk cows tend to increase. But usually such an enterprise is restricted to the needs of the family with some incidental surplus for sale. The Palouse area is poorly adapted to dairying because of relatively low yields of hay and the low carrying capacities of pasture in midsummer and early fall. If additional hay and grazing resources are available beyond those needed for minimum dairy requirements, these resources tend to be used in support of a beef enterprise. For this reason, dairying is usually more important on small farms and beef production on large farms. Furthermore, for the most part fluctuations in cattle numbers are associated with changes in numbers of beef cattle.

Numbers of hogs and beef cattle tend to move in the same direction in response to favorable or unfavorable feeding ratios, although hogs are more responsive to changes in price than are cattle. Raising and feeding hogs is a way to convert wheat into cash. When the ratio of hog prices to wheat prices is favorable, numbers of hogs tend to expand. Wheat is usually worth more as a cash crop than as feed for livestock. For this reason, many farmers have no hogs at all or only a pig or two for family use.

Variation in Farm Organization and Crop Yields by Size of Farm

The cropping system varies by size of farm (table 13, p. 34). In 1935–52 harvested acreage amounted to 78 percent of the cropland on small farms, compared with 74 percent on large farms. Small farms grew relatively more oats, hay, and peas, and large farms grew relatively more wheat. Yields of wheat averaged 30.4 bushels per acre on small farms and 32.1 bushels on large farms.

Large farms tend to have more livestock per farm but less per acre than do small farms. A higher percentage of the farm income is derived from sales of crops on large farms.

These differences in farm organization and crop yields by size of farm, although small, affect farm income noticeably.

Farm Income and Expense [6]

At 1953 prices and average yields gross income on the average commercial family-operated wheat-pea farm is about $20,000. In 3 years—1947, 1952, and 1953—gross income exceeded $20,000 (fig. 3). This compares with the $5,400 obtained in 1935–39 (table 3).

In 1953 farm expense amounted to $10,000 as contrasted with $3,000 in 1935–39. With relatively few exceptions, the trend in farm expense has been steadily upward. This contrasts with the more irregular trend in gross income (fig. 3). Reasons for this difference between the two trend lines are: (1) Yearly fluctuations in crop yields affect gross income but do not materially affect farm expense; and (2) prices paid for cost items are more stable from year to year than are prices received from farm products (fig. 4). Prices of cost items bought by farmers tend to change at slower rates than do prices of commodities sold by farmers. This is the chief explanation for the low profit margins in the 1930's and the high profit margins in the 1940's. Cash expenses are more variable than are total farm expenses.

[6] Accounting terms used in this report are defined in accordance with accepted farm-management terminology. For those interested in an explanation of terms see appendix discussion.

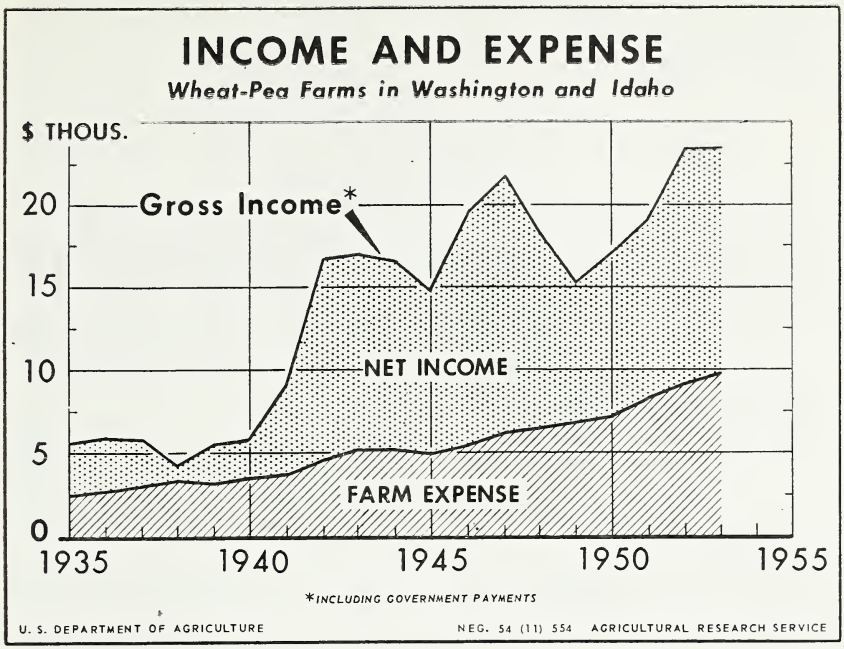

FIGURE 3.—Production expenses averaged 42 cents per dollar of gross income, but the ratio is highly variable, largely because of fluctuations in gross income.

This is particularly true of individual farms because of the occasional purchase of large items of machinery.

Prices paid by wheat-pea farmers increased each year from 1939 to 1953. By 1953 they were 158 percent higher than in 1939. But prices received declined in 1949 and 1950 and the trend in the ratio of prices received to prices paid has been downward since 1947. Sudden price declines of 20 percent or more have occurred on these farms. For example, between 1936 and 1938 prices received declined 29 percent and between 1948 and 1950, 21 percent. The largest price decline of recent times occurred between 1929 and 1931. During these years the seasonal average price received for wheat by these farmers declined 67 percent. When these large and sudden declines in price occur profit margins are small or nonexistent.

Commercial Nature of Wheat-Pea Farming

Since 1940 about 90 percent of the net farm income has been derived from sales. The rest (10 percent) has been in the form of Government payments and farm perquisites. In 1935–39 nearly 20 percent of the net farm income came from Government payments. Since then the importance of Government payments has declined to about 2 percent of the net farm income.

Farm perquisites amounted to 13 percent of the net income in 1935–39, and to 5 percent in 1940–44. Since then the proportion has increased slightly to about 8 percent in 1950–53. House rent amounted to one-third to one-half of the perquisites; it has been

TABLE 3.—*Gross and net income per commercial wheat-pea farm, Washington and Idaho, 1953, with comparisons, averages 1935–49, annual 1951–53*

Item	Average			1951	1952	1953 [1]
	1935–39	1940–44	1947–49			
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Gross income	5, 424	13, 074	18, 364	18, 976	23, 342	23, 309
Less farm expense	2, 938	4, 403	6, 500	8, 260	9, 132	9, 971
Net farm income	2, 486	8, 671	11, 864	10, 716	14, 210	13, 338
Net sales [2]	1, 156	7, 466	10, 804	10, 504	11, 839	10, 971
Government payments	486	591	127	178	185	185
Change in inventory values [3]	523	185	47	−984	1, 172	1, 256
Perquisites	321	429	886	1, 018	1, 014	926
Total net farm income	2, 486	8, 671	11, 864	10, 716	14, 210	13, 338

[1] Preliminary.
[2] Receipts from sale of products less cash expense.
[3] Change in physical products at current prices. No credit for change in land values.

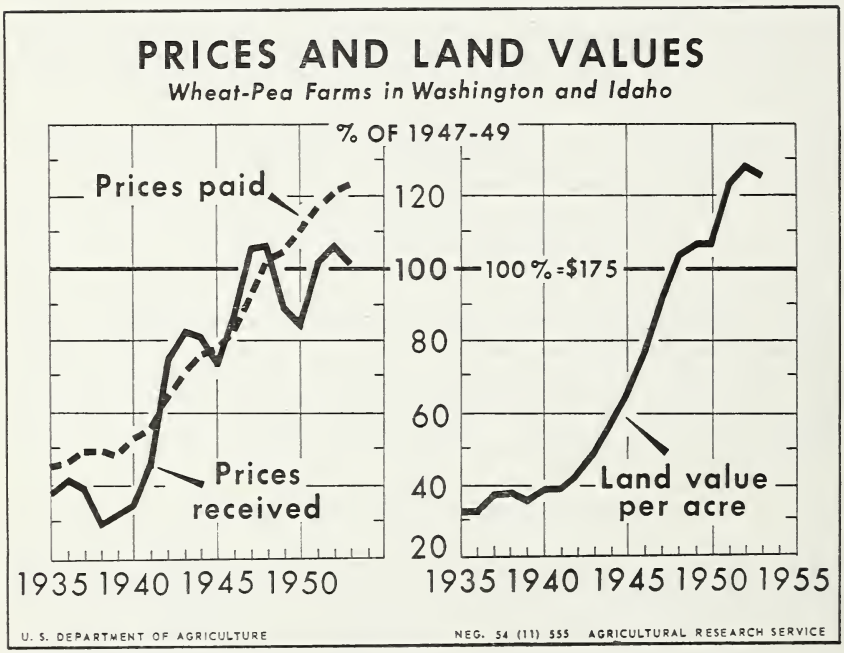

FIGURE 4.—The movement in prices received is more erratic than is the movement in prices paid. The sudden and often large drop in prices received without the offsetting drop in prices of things sold results in what is called the "price cost squeeze."

higher in recent years. Meat, dairy, and poultry products represent most of the other perquisites. From 75 to 90 percent of the livestock and livestock products produced in 1935 to 1953 were sold. The rest were used as perquisites (table 14, p. 35). Garden truck is relatively unimportant and there is no farm wood.

Variation in Farm Income by Size of Farm

Until recently, small farms produced a greater gross income per acre than larger farms (table 15, p. 35). This variation by size of farm was more evident before 1944 when greater numbers of livestock were raised in the area. With the decline in livestock production following 1943 and the greater importance of wheat in the farm organization after 1948, this difference by size of farm lost its importance.

Cost per acre of operating Palouse area farms decreases as size of farm increases. This was true, within the range in the size of farm observed in the study, reported here throughout the entire period 1935–53. Only part of the larger per acre costs on the small farms can be explained by their heavier concentrations of livestock. Large farms make a saving per acre in getting field work done by (1) using larger and newer machines which enables one man to accomplish more per day, and by (2) having more acres to keep both men and machines employed on the more productive work.

From 1935 to 1949 net farm income per crop acre was about the same in each size group. Greater gross incomes on smaller farms were approximately offset by greater expenses. Beginning with 1950 the larger farms produced larger gross incomes per acre and also had lower expenses per acre.

The percentage of net farm income received in the form of perquisites varies inversely with size of farm. From 1935 to 1952 perquisites contributed about 15 percent of net farm income on small, 7 percent on bulk-line, and 4 percent on large farms.

Income Factors

From 1941 to 1953 gross income averaged three times the amount received in 1935–40. About two-thirds of this increase was due to higher prices and one-third to greater physical production. Production depends upon harvested acreage and yield per acre, except for product added by converting crops into livestock.

Crops and Livestock

About 80 to 90 percent of the value of products sold, added to inventory, and used in the home are in the form of crops. The rest is in the form of livestock and livestock products (table 4). The value of farm-produced grains and hay fed to livestock other than that fed to horses equals about half the value of livestock production. About 90 to 95 percent of total farm production, therefore, comes directly or indirectly from crop production.

From 1935 to 1943 livestock production tended to expand in proportion to crop production. During much of this period the raising of hogs and beef cattle was profitable. In 1943 the price of wheat increased and the price of meat animals decreased. This brought

TABLE 4.—*Value of crop and livestock production at 1947–49 prices and at prices current in periods indicated, commercial wheat-pea farms, Washington and Idaho, averages 1935–49, annually 1951–53* [1]

Item	Average			1951	1952	1953 [2]
	1935–39	1940–44	1947–49			
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Value at 1947–49 prices:						
Crops	11, 050	14, 942	15, 956	16, 353	19, 898	20, 542
Livestock	2, 743	3, 784	2, 062	2, 060	1, 988	2, 062
All products	13, 793	18, 726	18, 018	18, 413	21, 886	22, 604
Current value:						
Crops	3, 893	10, 400	15, 720	15, 891	20, 584	20, 788
Livestock	890	1, 857	2, 057	2, 356	2, 027	1, 826
All products	4, 783	12, 257	17, 777	18, 247	22, 611	22, 614
	Index numbers 1947–49=100					
Price index: [3]						
Crops	35	70	99	97	103	101
Livestock	32	49	100	114	102	89
All products	35	65	99	99	103	100

[1] Products sold or used in the home plus changes in inventories.
[2] Preliminary.
[3] Current value divided by value at 1947–49 prices.

about liquidation of livestock in 1944 and 1945. Since 1946 livestock production has remained at about 10 percent of farm production.

Crop Income

Since 1935 crop production per farm and prices received for crops sold have increased (table 5). The increase in crop production resulted from increases in both harvested acreage and crop yields per acre.

Commercial family-operated wheat-pea farms produced an average of $20,500 worth of crops in 1951–53. This was 4.5 times the 1935–1939 value, and 1.2 times the 1947–49 value. About 31 percent of the increase in crop income from 1935–39 to 1951–53 was due to increased production and 69 percent to increase in prices. About 60 percent of the increase in crop production was due to an increase in acreage harvested and the other 40 percent to an increase in crop yields per acre. Most of the increase in harvested acres has been due to the increase in size of farm. The percentage of farmland in harvested crops varies somewhat with economic conditions. The proportion between 1935 and 1953 varied between 62 percent in 1938 and 1939 and 78 percent in 1944, 1945, 1947, and 1949. The current 1953 estimate is 71 percent. Acres per farm, although relatively stable from year to year, have gradually increased so that 1950–53 acreage per farm was a little more than 1.2 times the acreage of

1935–39. The percentage of farmland in harvested crops in 1950–53 was 1.05 times the percentage in 1935–39. Total cropland harvested in 1950–53 was 1.3 times the acreage harvested in 1935–39.

TABLE 5.—*Crop-income factors on commercial wheat-pea farms, 1953 with comparisons, Washington and Idaho, average 1935–49, annually 1952–53*

Item	Unit	Average			1952	1953 [1]
		1935–39	1940–44	1947–49		
Per farm:						
Acreage harvested	Acre	259. 2	317. 2	356. 4	343. 1	362. 5
Net production [2]	1947–49 dollar.	12, 652	16, 708	16, 814	20, 881	21, 531
Current value [3]	Dollar	4, 535	11, 436	16, 814	22, 237	21, 938
Price index [4]		35. 84	68. 45	100. 00	106. 49	101. 89
Per acre:						
Net production [2]	1947–49 dollar.	48. 81	52. 67	47. 18	60. 86	59. 40
Current value [3]	Dollar	17. 50	36. 05	47. 18	64. 81	60. 52

[1] Preliminary.
[2] Quantities of various crops produced less quantity used for seed at their 1947–49 average prices.
[3] Net production at actual prices.
[4] Value of crops at actual prices divided by value of crops at 1947–49 prices.

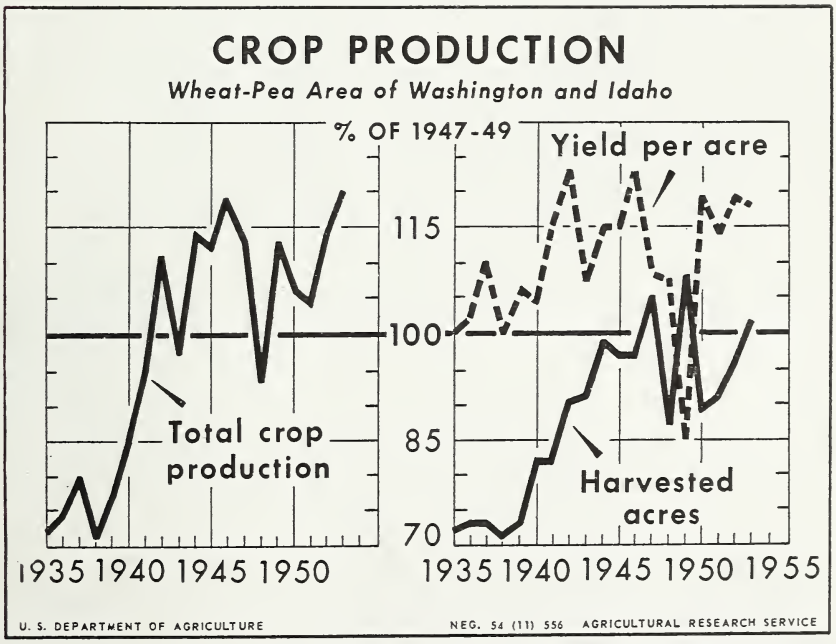

FIGURE 5.—Index of crop production equals crop yield index times index of harvested acres. In the short run, yield is the more important factor. In the long run, harvested acreage is more important. Variation in fallow explains the variation in harvested acres.

Crop yields largely determine production from one year to the next. Even so, yearly fluctuations in crop yields are minor in the Palouse area as compared to other areas (fig. 5). With the possible exception of lands under irrigation in no other major type-of-farming area in this country are yields more uniform from year to year. From 1935 to 1953, yields for the area as a whole varied an average of 7 percent per year. For individual crops and for individual farms the variation would be somewhat greater.

Economic Motivation

To a large extent prices determine what and how much is produced. For example, from 1935 to 1953 an increase in farm prices received by Palouse area farmers was usually associated with increased production. When price prospects are favorable Palouse farmers increase production by increasing the amount of annual cropping at the expense of summer fallow and grassland. Since 1949 Palouse farmers have used increasing quantities of nitrates. This is due to (1) the high price of wheat relative to the price of nitrates which makes their use profitable and (2) the growing recognition of the effectiveness of nitrates in increasing wheat yields. From 1944 to 1953 the quantity of wheat required to buy one ton of nitrate was only about half as much as that required to buy one ton from 1935 to 1942. No doubt it would have been profitable to use nitrate in the Palouse area before 1947, the year when it first came into extensive use. Lack of knowledge of the response of wheat to nitrate probably was a major reason for the small quantity used before 1947. With wheat high in price relative to nitrate observations showed that use of nitrate was profitable.

If prices of wheat and peas should decline substantially relative to prices of the commodities and services bought by farmers; certain developments in Palouse area farming would probably occur:

(1) The trend toward increased use of fertilizer would be retarded and perhaps reversed, depending upon the extent of the price decline.

(2) Acreage used for summer fallow would increase, depending upon the decline in pea prices.

(3) Acreages of hay and pasture, and livestock numbers would increase somewhat, depending upon the price of livestock compared to the price of grains.

Experience of Palouse farmers with use of nitrate fertilizer was largely gained after 1949 when the price of wheat was high relative to the price of nitrate. Now that the experience has been obtained it is likely that the practice will continue even if it becomes less profitable. Assuming some economic advantage from the use of nitrate, but a period of declining prices for wheat relative to prices of nitrate, a curtailment in use of nitrate more or less proportional to the decline in wheat prices can be expected for several reasons.

Farmers hesitate to incur an optional cash expense for an uncertain future income. Nitrate fertilizer is applied from 2 months to more than a year in advance of harvest. What the yield response will be on a given field depends partly upon climatic conditions. As the probable profit margins decline more farmers may use less nitrate.

The system of renting in vogue in the Palouse area, in which the tenant pays all the operating costs and receives only two-thirds of the production would discourage use of nitrate in periods of declining wheat prices.

As the price of wheat declines relative to the price of commercial nitrates, other ways of obtaining nitrogen, such as green manure and summer fallow, become more economical. The increased use of green manure and summer fallow may be stimulated also by acreage of limitations on wheat.

If prices of wheat and of other crops fall relative to the price of hogs, hog numbers would greatly expand in the Palouse area. The average Palouse farmer raised 44 pigs in 1943. If the hog-wheat ratio had remained favorable during 1943, hog numbers probably would have been even larger in 1944. Even in 1943, when hog numbers were greatest on wheat-pea farms, the number of hogs produced was only about a third of the number produced on hog-beef cattle farms in the Corn Belt. In that year wheat-pea farmers fed about a fourth of their net grain production. Expansion beyond 1943 hog numbers probably would run into increasing costs because of lack of housing, labor, and pasture resources. Hog numbers probably could be increased from the present low numbers of around 6 pigs per farm to around 45, the 1943 number, with present facilities.

Palouse farmers at times make major shifts in the proportions of the crops they grow (fig. 2). Most of this shifting is to their economic advantage (figs. 6 and 7). Acreage of peas varied from 60 percent of the harvested acreage in 1943 to 17 percent in 1952. Acreage of wheat varied from 26 to 71 percent. The shifting between these two

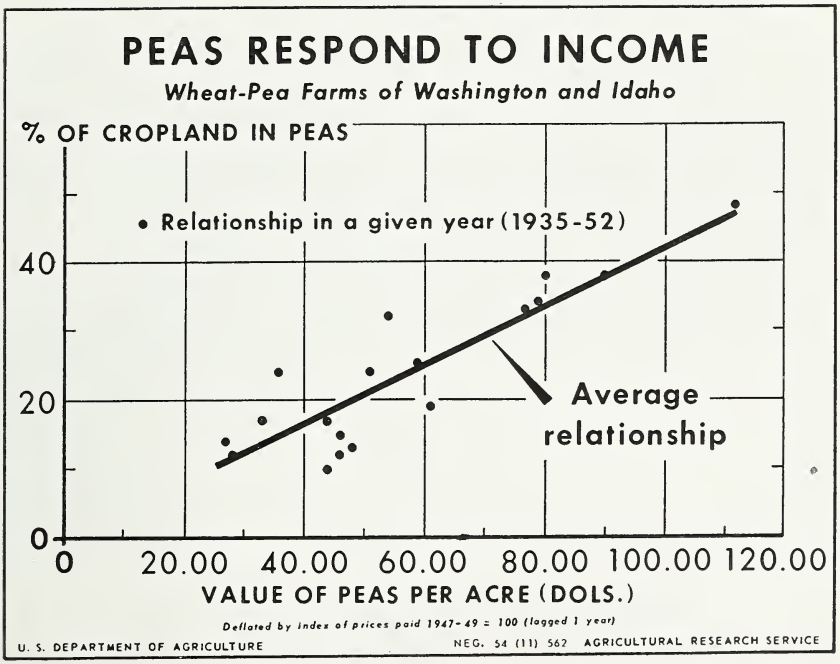

FIGURE 6.—An increase of $1 per acre in income from peas, assuming that prices paid for goods and services were constant, resulted in the following year in an increase of an additional 4.3 acres of peas for each 100 acres of cropland. About 79 percent of the variation in the percentage of cropland used for peas between 1936 and 1953 can be explained by the variation in per acre income of previous years, adjusted for changes in prices paid.

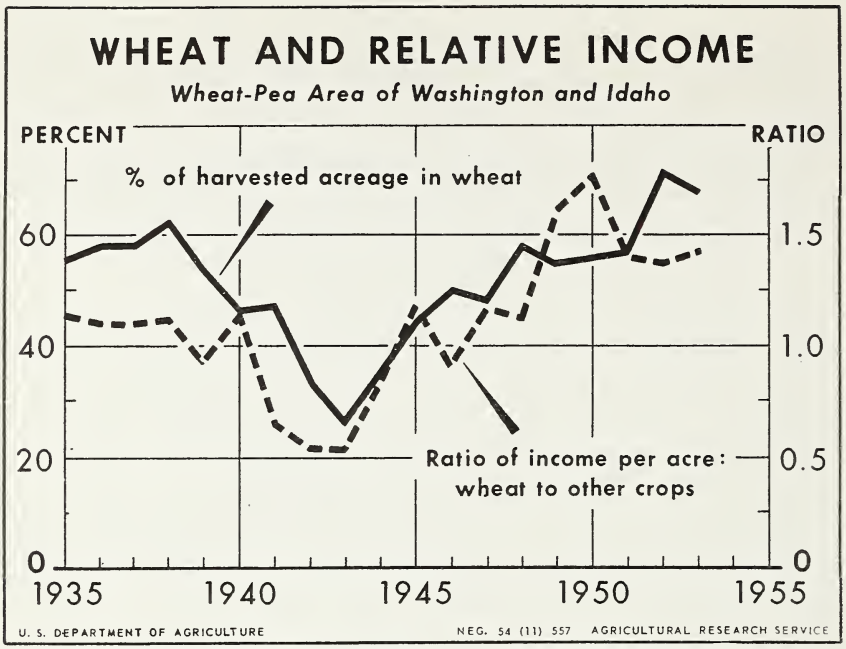

FIGURE 7.—Acreage of wheat varies with its relative per acre income.

major crops is a result of the corresponding shift in their relative per acre returns. Shifts are easier in this area than in many others because of the similarity in labor and machinery requirements for wheat and peas.

No matter how profitable one crop may become relative to other crops, Palouse farmers do not limit their operations to a one-crop system. Reasons for this are briefly as follows:

(1) Need for erosion control and maintenance of soil fertility.
(2) Economy in use of labor and machinery.
(3) Minimizing income risk from crop failure and price declines.

In the absence of guaranteed or contracted prices farmers cannot tell at planting time what price relations will be at harvest. Although they have done a fairly good job of modifying their existing farm organization to agree with major price shifts, often minor yearly shifts have been in the wrong direction. The shifts shown in figures 6 and 7 represent the average response of all farmers. Some vary their farm organization little, whereas others make radical changes from year to year. A major factor determining farm income for a given size of farm is how well its organization maximizes returns for the existing price situation.

Valuation and Composition of Farm Assets

In 1935 farm assets (both real and personal property) averaged about $26,000. By 1953 their value had increased to $135,000, five times the value in 1935 (fig. 8). About 78 percent of this increase was due to the increase in the average price or value per unit of the farm assets and the other 22 percent to the increase in the quantity or value of the farm assets at constant prices (table 6).

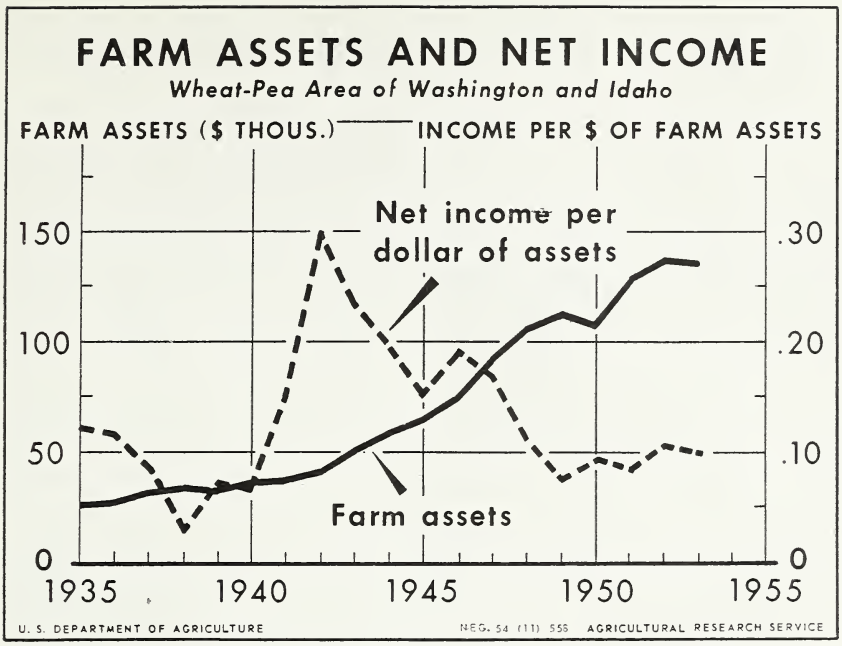

FIGURE 8.—From 1939 to 1943, net farm income increased faster than the value of farm assets but since 1943 assets have increased faster than income.

Between 1935 and 1953 real estate comprised 75 to 85 percent of the value of all farm assets. During this period of time about a third of the land was owned by the farm operators. Some of the owner-operated land was mortgaged. Even though chattel mortgages were relatively unimportant, the operator's net worth on the average was less than 25 percent of the total value of all farm assets. Equities of individual farmers vary from about 10 percent to 100 percent of the market value of the assets. But in this analysis no attempt is made to allocate costs between landlord and tenant or between owner and lender.

Physical Assets [7]

The quantity or value at constant dollars of farm machinery and equipment per farm in 1953 was 2.5 times the amount in 1935. In 1953 the quantity of equipment per crop acre was nearly double that in 1935 (table 7. Some of this increase represents replacement of horses by tractors but most of it represents a net addition to working capital. The rate of increase in the purchase of additional equipment since 1935 was greatest between 1935 and 1940. During this period many gas tractors were replaced by diesel tractors and much horse equipment was replaced by types better suited to tractor power. Since 1940 additional equipment over and above that necessary to offset depreciation has been added but the rate of increase has slowed down.

[7] For discussion of land area per farm see section on size of farm, page 4, and for livestock numbers see discussion on the livestock enterprises, page 7.

TABLE 6.—*Quantity and value of farm assets on commercial wheat-pea farms, 1953 with comparisons, Washington and Idaho, specified years, 1935–53*

Item	1935 Jan. 1	1940 Jan. 1	1945 Jan. 1	1950 Jan. 1	1953 Jan. 1 [1]
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Valuation at actual prices:					
Real estate	22, 173	29, 057	51, 162	89, 759	111, 616
Farm machinery and equipment	1, 921	3, 607	6, 077	9, 735	12, 333
Horses	533	165	50	29	(2)
Other livestock	376	848	1, 287	1, 538	2, 079
Crops on hand	1, 104	2, 292	5, 965	6, 545	9, 319
Total valuation	26, 107	35, 969	64, 541	107, 606	135, 347
Valuation at 1947–49 prices:					
Real estate	68, 075	74, 550	77, 700	84, 350	89, 600
Farm machinery and equipment	3, 723	6, 378	7, 586	8, 695	9, 425
Horses	346	139	58	19	(2)
Other livestock	2, 153	2, 907	2, 543	1, 681	2, 181
Crops on hand	2, 783	6, 641	7, 704	8, 225	8, 688
Total valuation	77, 080	90, 615	95, 591	102, 970	109, 894
	1947–49=100				
Index of value per unit:					
Real estate	33	39	66	106	125
Farm machinery and equipment	52	57	80	112	131
Horses	154	119	86	153	--------
Other livestock	17	29	51	91	95
Crops on hand	40	35	77	80	107
All assets	34	40	68	105	123

[1] Preliminary.
[2] Practically no draft horses were used in the Palouse area after 1950.

Disappearance of draft horses resulted from the advent of economical mechanical power which permits more work to be done with less labor. Mechanization is the basic reason for the growth in farm size.

Since 1935 increasing quantities of grain and peas have been carried over from harvest into the next calendar year. Practically all this inventory is sold before the next year's harvest. A large part of each year's crop that is held for sale is stored in local public warehouses. The direction in which farmers think prices will go influences the quantity of produce held and the date of sale. Factors that tend to lengthen the storage period are cheap storage rates, low interest rates on loans secured by warehouse receipts, and the Government storage-loan policy.

Equipment per Crop Acre by Size of Farm

The smaller the farm the greater is the investment in machinery and equipment per crop acre (table 7). Moreover, this differential

TABLE 7.—*Value at 1947–49 prices of machinery and equipment per crop acre, by size of farm, Washington and Idaho, selected years 1935–50*

Size of farm	1935 Jan. 1	1940 Jan. 1	1945 Jan. 1	1950 Jan. 1
	Dollars	*Dollars*	*Dollars*	*Dollars*
Small	12. 19	19. 82	25. 57	28. 50
Bulk-line	9. 95	16. 17	19. 79	21. 34
Large	8. 93	12. 50	12. 76	12. 63
Area average	10. 26	16. 07	18. 45	19. 48

between small and large farms has widened. Small farms have increased their machinery and their tractor horsepower at faster rates than have large farms. In 1935 the amount of power and equipment per crop acre on the average small farm was 1.4 times the amount on the average large farm. By 1950 this ratio had increased to 2.3.

The shift from horses to gas tractors and from gas tractors to diesel tractors began first with large farms. These conversions were almost complete on the large farms before more than 25 percent of the small farms had converted. Since 1940 large farms have maintained their stock of power and equipment items at about $12.75 (1947–49 prices) per crop acre. Smaller farms were still adding to their power and equipment items in 1953.

Investment in power and equipment items on small farms is restricted by means of the following:

(1) Purchase of secondhand equipment.
(2) Purchase of small sizes.
(3) Purchase of part interest with neighbors.
(4) Getting machine work done by exchange of labor or by custom work.
(5) Omitting some of the cultural operations.
(6) Using old equipment.

Some small farms are operated by widows or older men who are semiretired. Field work on these farms is done mainly by custom operators. Other operators of small farms have full sets of equipment. They reduce their per acre cost by doing custom work. These different ways of meeting the investment problem on small farms result in a great range in amount of equipment per farm.

Equipment on bulk-line and large farms is more standardized. Ordinarily a bulk-line farm has about one complete set of machinery which is usually less than half worn out. A large farm frequently has two sets, one fairly new and the other much older.

Price of Capital Items

Prices for capital items have trended upward in the Palouse since 1935. Prices in the January inventory for productive livestock, and even more so for crops, reflect their market prices. Prices for breeding stock tend to fluctuate more widely than do prices for market classes.

The index of farm machinery and equipment inventory values reflects the replacement cost of these items.

Greatest increase in cost of capital assets in the area has been in real estate. In 1953 the price of land was four times the 1935 price

(fig. 4). This rapid increase indicates a profitable agriculture. Most farm operators have wanted to continue farming. Many operators of small and medium-sized farms have tried to buy or rent additional land. In this way they could lower their per acre investment costs for power machinery and buildings, and add to the effectiveness of their own labor. These two factors have contributed to the increase in size of farms and to the increase in the price of land. High land prices and the tendency of renters to retain their leases have retarded the increase in average size of farm.

As farm profits increase they tend to be capitalized into land values. If a charge is made for the use of land in proportion to its value, the higher land values will tend to reduce profits to normal levels unless farm incomes have increased still further in the meantime. The process of land values catching up to income is to the advantage of the farm operator so long as prices and incomes rise. But when prices and incomes fall, farm operators may be in financial difficulty. This is particularly true for an operator who acquired debts at the higher price level.

Farm Expenses

Farm expenses, as shown in figure 3, have steadily increased. Most of this increase from 1935 to 1938 was due to an increase in physical quantities of materials and services used in production. But, beginning with 1940 and continuing through 1953, most of the increase in farm expenses was due to prices paid per unit. Prices paid in 1953 for goods and services used in production were 2.3 times the rate paid in 1940. The volume of these goods and services bought in 1953 was only 1.2 times the volume bought in 1940.

Prices Paid for Production Items

The composite price index for all goods and services exclusive of land and family labor used in production remained relatively constant from 1935 to 1939 (fig. 4). From 1939 to 1953 this index has shown a sharp and rather consistent rise. But the individual items that make up the index have had quite divergent price movements (table 8).

Wage rates doubled between 1940 and 1943 and almost doubled again between 1943 and 1953. The index of power and machinery prices doubled between 1939 and 1953. Tax rates (both real and personal) changed but little from 1935 to 1945, increased rapidly between 1946 and 1950, and leveled off between 1951 and 1953 at about 1.8 times the 1945 rates. Prices for building and fencing materials have increased moderately each year since 1940 and in 1953 they were about 2.5 times as high as in 1940. Prices paid for bags have multiplied 5 times since 1937.

Prices paid for grass and legume seed vary more from year to year than do prices for most items of expense. Attention given to soil conservation from 1935 to 1939 resulted in both increased demand and relatively high prices for grass and legume seed.

The price of protein feeds bought by Palouse farmers remained approximately constant from 1935 to 1941. In 1947 they were 2.3 times the 1941 rates. Since 1947 the movement for prices of protein feed has been irregular.

The divergent movements of the various cost elements that have occurred in the Palouse from 1935 to 1953 were certain to affect

TABLE 8.—*Index numbers of prices paid for goods and services used in production by wheat-pea farmers, Washington and Idaho, averages 1935–44, annual 1950–53*

[Index numbers 1947–49=100]

Item	Average		1950	1951	1952	1953 [1]
	1935–39	1940–44				
Wage rates	28	56	92	115	133	136
Power and machinery	61	70	114	120	124	128
Real estate taxes	63	64	130	111	118	118
Personal property taxes	29	32	117	115	124	125
Building materials	49	57	105	117	117	118
Fencing materials	49	58	106	118	124	127
Grass and legume seeds	65	65	128	110	110	82
Protein feeds	43	56	93	100	110	101
Bags	32	67	115	165	(2)	(2)
All items	48	64	110	117	121	123

[1] Preliminary.
[2] Very few bags bought after 1951.

farm operations. Since 1935 Palouse farmers have made many changes in their farming methods. For example, the diesel tractor for the gas tractor, diesel fuel for gasoline, DDT for rotenone, 2, 4–D and commercial nitrogen for summer fallow. In 1935 wheat-pea farmers used in their tractors 14.4 times as many gallons of gasoline as of diesel fuel. In 1953 they used 2.5 times as much diesel fuel as gasoline. In 1935 gasoline cost 16 cents a gallon and diesel fuel cost 8.25 cents. In 1953 gasoline cost 20.5 cents per gallon and diesel fuel cost 17 cents. Work accomplished per gallon of diesel fuel is greater than work accomplished per gallon of gasoline (table 9). Despite the rise in fuel costs between 1935 and 1953 of 4.5 cents per gallon of gasoline and 8.5 cents per gallon of diesel fuel, the cost of tractor fuel per horsepower hour was less in 1953 than in 1935. This was due to the shift to less expensive and more efficient fuel. Without shifts of this type the index of prices paid, as shown in table 8, would have risen higher than it did.

Substitution of power and machinery for man labor was stimulated by the change in their relative prices as well as the change in efficiency resulting from mechanization. Mechanization caused some reduction in amount of labor hired per farm. For example, prior to bulk handling a combine required a 3-to-5 man crew. Today, combining is done with only 2 men and in some cases with only 1. But except for harvest, most farm work on wheat-pea farms seldom requires more than 1 man per crew. Speeding up the rate of accomplishment by having larger and more effective machines has permitted family farms to grow in size and also to reduce the amount of harvest labor required.

Technical developments affect the type of expense incurred; for example, the recent introduction of 2, 4–D and DDT. But even these would not be used if they were too highly priced.

The extent to which some items of expense are bought depends upon their cost relative to prices received for commodities produced

TABLE 9.—*Horsepower tractor hours per acre and fuel consumption rates by operations, commercial wheat-pea farms, Washington and Idaho* [1]

Operation	Horsepower tractor hours per acre	Fuel used per acre		Fuel used per horsepower hour	
		Diesel	Gas	Diesel	Gas
	Hours	*Gallons*	*Gallons*	*Gallons*	*Gallons*
Plowing	15. 91	1. 50	2. 00	0. 09	0. 12
Combining peas	14. 75	1. 00	1. 50	. 07	. 10
Combining grain	13. 34	. 90	1. 35	. 07	. 10
Disking (tandem)	8. 29	. 66	. 74	. 08	. 09
Duckfoot	7. 89	. 76	1. 09	. 10	. 14
Harrow, springtooth	6. 48	. 54	. 84	. 08	. 13
Drilling	5. 43	. 44	. 65	. 08	. 12
Rod weed	5. 28	. 40	. 71	. 08	. 13
Harrow, spiketooth	2. 64	. 26	. 37	. 10	. 14
All tillage and drilling operations	--------	--------	--------	. 085	. 135

[1] Based on a farm survey taken in 1948.

as a result of the expense. This was illustrated with wheat and fertilizer.[8]

Changes in Specific Production Items

The composition of farm expenses has changed since 1935 (fig. 9). Gallons of tractor fuel, number of truck miles, quantity of farm machinery, and the like used in production in 1953 were 3.0 times the quantities used in 1935. While use of power and machinery was increasing, use of hired labor was decreasing. The average wheat-pea farm hired 196 days of labor in 1935 and 118 days in 1953, a decrease of about 40 percent. In terms of the price level of 1947–49, for each $1 spent for hired labor in 1935, 80 cents were spent for power and machinery. Using the same price level in 1953, for each $1 spent for hired labor, $3.90 were spent for power and machinery. In other words, the ratio of power and machinery to hired labor in 1953 was 4.9 times the ratio in 1935.

The increase in farm investments affects farm expenses directly because of taxation. Between 1935 and 1953 the number of acres per farm increased 32 percent and the quantity of personal property subject to tax increased 81 percent.

Quantities of materials and services used for livestock, buildings, fences, and electricity tend to vary with livestock numbers. The quantities used in this group of expenses increased 68 percent from 1935 to 1943; decreased 45 percent from 1943 to 1946; and have remained relatively constant since 1946. Livestock expense consists mainly of the cost of purchased feeds and to a minor extent of veterinary services. Materials bought for fencing vary with size of farm and numbers of livestock.

In these estimates building expense is limited to service buildings. The charge in a given year is estimated to be 6 percent of the value in the inventory at the beginning of the year, plus 6 percent of the

[8] See page 14.

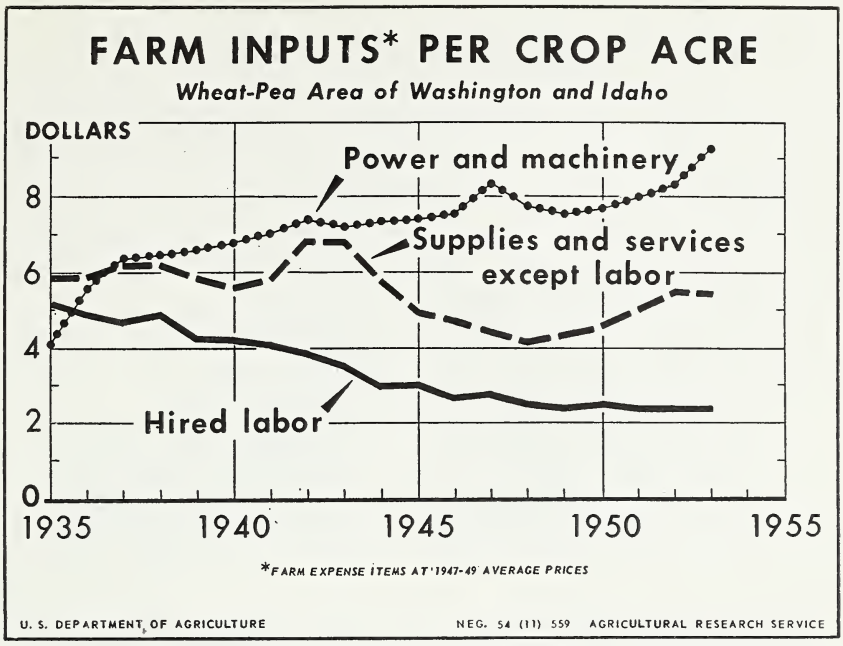

FIGURE 9.—Farming methods have changed since 1935. Power machinery has made labor more effective.

repairs and improvements made during the year. The building value remaining at the end of each year is reappraised at the beginning of the next year to allow for changes in the price of building materials.

Telephone and electricity chargeable to the farm are minor expense items. The cost of telephone service was usually less than $50 a year. In 1935 the average farm used about 61 kilowatt hours of electricity; in 1953, 800 kilowatt hours were used. The cost per kilowatt hour declined from 5 cents in 1935 to 1.4 cents in 1953. This reduction was due to increased consumption and lower schedules of cost for given consumption.[9]

Bags, or sacks, were important items of farm expense as late as 1947. The trend in the number used per year has been downward since the early thirties. Before 1930 practically all grain and peas were marketed in bags. Beginning about that time farmers began to shift over to bulk handling of grain. This entailed considerable capital outlay in modifying combines, buying additional motortrucks, and building suitable types of warehouses or elevators by local marketing agencies. The transition was begun first by operators of large farms and last by operators of small farms. After bulk handling was well established in the marketing of grain, the process was adapted to peas. For many years prior to World War II bulk handling of grain and peas had proved to be a more efficient way to market crops than marketing in bags. During the war bags became relatively high priced and hard to obtain. This situation, together with the opportunity to reduce labor and heavy work speeded up the shifting process. By 1947 the days of bagging were practically over. This

[9] See STIPPLER, HENRY H. ELECTRICITY ON FARMS IN EASTERN WASHINGTON. Wash. State Agr. Expt. Sta. Cir. 149. 1951.

contrasts with 1935–43 when the average farmer used between 1,500 to 2,200 bags a year.

Grass and legume seeds constitute a minor farm expense. Purchases of these seeds increased from 1935 to a peak in 1938 when the average farm used about 400 pounds of sweetclover seed, 85 pounds of alfalfa seed, and 125 pounds of mixed grass seed. The shift toward more cash crops and the reduction in livestock numbers has reduced the need for grass and legume seed.

Nitrate fertilizer is a new item of expense for Palouse farmers. Starting from practically nothing prior to 1947, its rate of application has increased each year. In 1953 the average farmer applied about 5,500 pounds of elemental nitrogen.

Gypsum is used as a soil conditioner and as a source of sulphur. It stimulates the growth of legumes. Between 2 and 3 tons are bought annually by the average Palouse farmer. The quantity purchased varies with the acreage of legumes seeded.

Appreciable quantities of dusting material for control of weevil in peas have been used since 1939. The quantity used varies with the acreage in peas and the degree of infestation. Ordinarily, a farmer treats only the part of his fields in which infestation is likely. Rotenone was the chief insecticide used before 1946. DDT was first used in this area in 1946 and by 1948 it had largely replaced rotenone.

Sodium chlorate has been used for many years to kill noxious weeds in heavily infested areas. The more common noxious weeds are morning-glory and Canadian thistle. Reduction of summer fallow because of the expanded acreage in peas between 1942 and 1947 led to an increase in infestation of noxious weeds. By 1946 almost all farms had some infestation. In that year about 2 pounds of sodium chlorate were purchased per crop acre. This was twice the estimated rate of application prior to 1942. Since 1946 the rate of application has declined as the area and degree of infestation have been reduced. Farmers have turned to other methods of control such as clean cultivated summer fallow and the use of 2, 4–D. The latter material was first used in the Palouse about 1946. Since then its use has expanded. In 1953 about 20 gallons were used per farm.

Power and Machinery Costs

The cost of power and equipment on average wheat-pea farms in 1953 was about 5.6 times larger than in 1935, $1,000 compared with $5,600 (fig. 10). Approximately 40 percent of this increase was due to higher prices. The remaining 60 percent was due to increases in machines (newer, bigger, additional) and in materials (fuel, oil, lubricants, and repairs) used in operating machines. Usually between 50 and 60 percent of the power and machinery costs are operating costs. Depreciation makes up the rest.

Depreciation is estimated from the appraisal value of the various machines on farms January 1, and the value of machines and equipment bought during the year. The latter are valued at cost while the former are revalued each year on the basis of the current price times the percentage of their value that is estimated to be left in them. The rate of depreciation varies from 16 to 21 percent, depending upon the type of machine.

All machines in use sooner or later attain an age after which repairs about offset depreciation. On wheat-pea farms most machines attain this age after 7 to 10 years of use.

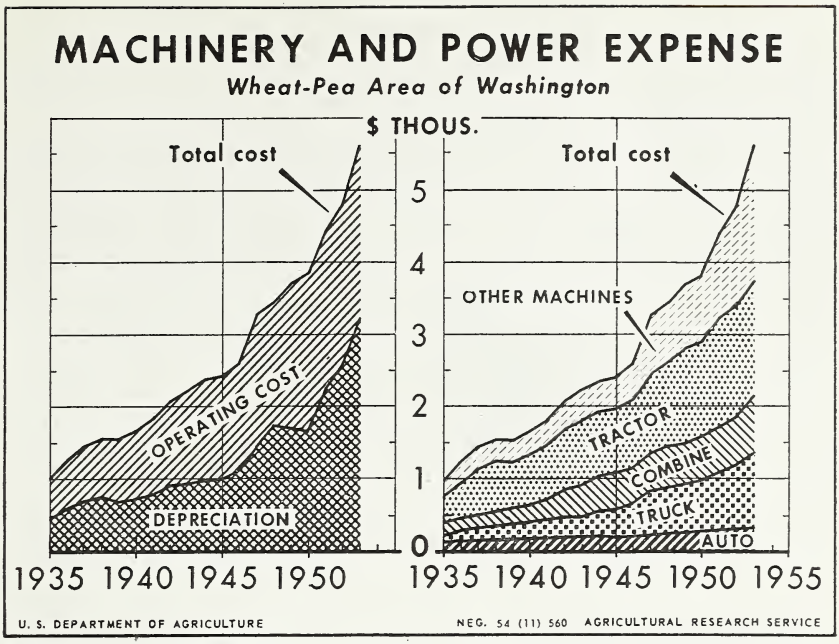

FIGURE 10.—The cost of farm machinery in 1953 was about double that of 1947. The cost is about equally divided between operating cost and depreciation. The cost for motor vehicles has not increased as fast as has the cost of other equipment.

Many small farms are operated mainly with old equipment which has little or no depreciation. Larger farms tend to be operated with relatively new equipment on which depreciation is considerable.

Tractor Costs

The number of crawler tractors in the Palouse area increased rapidly after the depression of the early thirties (table 16, page 36). Conversion from horses to tractors was about over on large and medium or bulk-line farms by 1938 and on small farms by 1947. There was little or no increase in number of tractors on wheat-pea farms during World War II. During that time about 70 percent of the small farms had tractors. Nearly all bulk-line farms had at least one tractor and every other large farm had at least two tractors. Today most small and bulk-line farms have one crawler tractor and most large farms have at least two.

Auxiliary tractors, mainly wheel but including a few small crawlers, began to be used on Palouse farms about 1940. Today about a third of the small farms have an auxiliary. About two-thirds of the bulk-line and nearly all of the large farms have them. These tractors are used for haying, spraying, hauling manure, fixing fences, and other light jobs.

Many farmers are finding it more practical to hire light work done by custom operators than to keep a tractor for these jobs. The number of auxiliary tractors may decline in the future. This is more likely to happen if livestock remains unimportant.

Small farms have crawler tractors with about 24.2 drawbar horsepower; bulk-line, 28.6; and large, 33.8. Average size of auxiliaries

was 17.8 drawbar horsepower. There has been little change in these sizes since 1935. Total tractor horsepower per farm increased rapidly after 1935 and in 1947 it showed signs of reaching a maximum. Since 1947 the total rated drawbar horsepower of all tractors combined per farm has been about 30 for small farms, 50 for bulk-line farms, and 80 for large farms.

Total cost of maintaining tractors (depreciation and repairs) plus tractor fuel and lubricants doubled between 1935 and 1941 and doubled again between 1941 and 1951. In 1953 this cost amounted to more than $1,600 per farm; 4.5 times the 1935 cost. The large increase in number of tractors per farm was the chief reason for the increasing costs between 1935 and 1941. Between 1941 and 1953 increases in prices of new tractors and pay rates of mechanics were more important reasons. The number of tractors also increased somewhat; these were mainly auxiliaries in this period, but the rate of increase was slight as compared to the rate of increase in 1935–41.

Cost of tractor repairs, aside from cost of mechanics' services and price of tractor parts, varies with age of the tractor and amount of tractor work. As age of the tractor increases the repair rate per crop acre increases rapidly.

Relationship between age of tractor and tractor repair per crop acre, wheat-pea area of Washington and Idaho, 1948, is shown below:

Age of tractor	*Dollars of repair cost per crop acre 1948 prices*
0 (year of purchase)	0
1–2	.29
3–6	.73
7 and older	1.34

From 1935 to 1943 costs of repairs increased relative to depreciation charges and during the World War II years, 1944–47, repair charges were about the same as depreciation. Since 1947 depreciation charges have tended to increase relative to repair charges.

Costs of tractor fuel and lubricants amounted to 40 percent of total tractor costs in 1935–39. After 1939 these costs increased at slower rates than other tractor costs. Since 1948 they have varied between 30 and 26 percent of the total cost. From 1935 to 1939 the quantity of fuel and lubricants used per farm more than doubled. This increase was due to the increase in amount of work done with tractors; horse work declined rapidly. Since 1943 the quantity of fuel used by tractors has declined slightly because of the greater economy in use of fuel by diesel tractors as compared to the older gas tractors and because a higher percentage of the cropland has been used for wheat and other small grains which require less machine work than peas. (See figure 2.) Horsepower tractor hours per acre used in cultivating and drilling operations [1] by type of crop in 1948 are shown below:

Crop	*Horsepower tractor hours per acre*
Peas	31.1
Winter wheat after stubble	8.5
Winter wheat after fallow	5.4
Summer fallow and green-manure operations	26.7
Spring grain after fallow	8.1
Spring grain after stubble	24.8
Spring grain after winter-wheat abandonment	16.4
Extra operations for new seedings established with a nurse crop	12.2

[1] Excludes plowing and combining. (See table 9.)

Combine Costs

The proportion of farms with combines has increased markedly since 1935. Prior to 1944 most small farms relied on a neighbor's combine or on a custom operator. This was true also of bulk-line farmers before 1937. Since 1935 large farms have had at least one combine per farm. Today about 90 percent of the small and bulk-line farms have at least one combine and many large farms have two or more.

The increase in number of combines per farm since 1935 has been due to more crop acres per farm and to reduction of acreage in summer fallow. Favorable incomes during most of the period provided both the money to buy the combines and the incentive to harvest crops before there was likelihood of loss from fall rains.

Most of the combines on wheat-pea farms are tractor drawn. The steepness of the topography is probably the main reason why self-propelled combines are used less than in other areas. Most combines range in size from 12 to 16½ feet. In 1948 combines on small farms averaged 12 feet, on bulk-line 14 feet, and on large farms 15 feet. It is probable that these differences were less in earlier years.

From 1935 to 1953 combine costs varied between 14 and 20 percent of all machinery and power cost. Cost per farm has increased progressively. In 1935 it was $172 compared with $786 in 1953. Depreciation is the major factor responsible for the additional costs. In 1953 depreciation on combines averaged about $421 per farm. This is about 10 times the amount in 1935. In 1953 operating costs (fuel, oil, grease, and repairs) amounted to $365 per farm compared with $131 in 1935. Practically all this increase in operating costs has been due to higher prices of these materials.

The quantity of materials used in combining an acre of peas is about 18 percent greater than that used in combining an acre of grain (table 10).

TABLE 10.—*Cost of combining grain and peas, commercial wheat-pea farms, Washington and Idaho, 1948*

Item	Unit	Acre costs	
		Wheat	Peas
Repairs:			
Combines under 2 years	1946 dollar	0. 175	0. 210
Combines 2 years and older	do	. 600	. 700
Gasoline	Gallon	. 9	1. 1
Oil	do	. 02	. 02
Grease	Pound	4	. 5

Other Farm Machinery Costs

This category includes all machinery and equipment costs except costs for motor vehicles and combines. These costs vary from about 20 to 30 percent of all machinery and power costs. Since 1935 they have become progressively more important and in 1953 they were about 9 times as high as in 1935. About 55 percent of this increase was due to increases in number, size, and newness of the machines and 45 percent to increases in their prices.

Truck Costs

Truck costs make up between 10 and 20 percent of total power and machinery costs. In 1953 they were more than 9 times as high as in 1935. Since 1935 the number of truck miles per farm has increased 4.4 times and the price of new trucks 2.7 times. From 1935 to 1941, operating cost per mile, which includes fuel, oil, grease, insurance, license, and repairs, varied between 3.2 and 4.0 cents. From 1944 to 1953 this cost ranged between 4.1 to 7.5 cents per mile. From 1935 to 1943 depreciation costs on trucks were less than half the operating costs. But the continued rise in the cost of new trucks relative to operating costs has brought the two charges closer together. In 1953 depreciation costs were two-thirds as much as operating costs.

Automobile Costs

In 1935 automobile costs chargeable to the farm business amounted to 11 percent of all costs of machinery and power.[10] These costs have increased since 1935 (around $100 in 1935 and $315 in 1953), but other machine costs have increased more and by 1953 farm automobile costs amounted to around 6 percent of total power and machinery costs. In 1935 automobile operating costs averaged about 2.3 cents a mile. They gradually increased and in 1953 they averaged around 4.5 cents a mile.

Numbers of miles driven for farm business are estimated to be 3,300 in 1935 and 4,500 in 1953. Depreciation charges amount to about 30 to 36 percent of the total costs. These charges have tended to increase faster than operating costs despite the increase in number of miles driven.

Allocation of Net Farm Income

Net farm income represents returns for use of real estate and working capital and returns to the operator and his family for labor and management. In order to divide the net farm income between the operator's labor and management on the one hand, and real estate and working capital on the other, it is assumed that capital earns a rate of return equal to the going interest rate. Real estate capital is assumed to earn a rate of return equal to interest charged on mortgages, and working capital is assumed to earn a rate of return equal to the interest charged on short-time loans.[11] If a farmer owns all or part of his farm, the return to capital also is available to him.

Charge for Capital

The allowance for capital in 1935 at prevailing interest rates at that time was $1,520 per farm (table 11). The allowance doubled between 1935 and 1945 and doubled again between 1945 and 1951. In 1953 this income attributed to capital was $6,663, or 4.4 times the amount in 1935.

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[10] Half of automobile costs are charged to farm business.

[11] Most investors expect to make more than the going interest rate. Otherwise, they would buy mortgages and loan their money out at interest. In periods of rising prices investors may make several times the going interest rates and in periods of falling prices there may not be enough income from the investment to maintain the value of the capital. The contribution of capital to farm income on any given farm may not bear a close relationship to the going rate of interest.

TABLE 11.—*Factors used in determining capital charges, commercial wheat-pea farms, Washington and Idaho, selected years, 1935–53*

Item	Unit	1935	1940	1945	1950	1953 [1]
Real estate:						
Land in farms	Acre	389	426	444	482	512
Value per acre	Dol	57	68	115	186	218
Value per farm	Dol	22, 173	29, 057	51, 162	89, 759	111, 616
Interest rate	Dol	. 057	. 047	. 046	. 048	. 048
Charge for real estate	Dol	1, 264	1, 366	2, 353	4, 308	5, 358
Working capital:						
Value at 1947–49 prices	Dol	9, 005	16, 065	17, 891	18, 620	20, 294
Price index	Pct	44	43	75	96	117
Value at current prices	Dol	3, 934	6, 912	13, 379	17, 847	23, 729
Interest rate	Dol	. 065	. 065	. 054	. 054	. 055
Charge for working capital	Dol	256	449	722	964	1, 305
Total charge all capital	Dol	1, 250	1, 815	3, 075	5, 272	6, 663

[1] Preliminary.

Approximately three-fourths of such income is assigned to real estate and the rest to working capital. Between 1935 and 1953 working capital accounted for 17 to 26 percent of the total.

Between 1935 and 1953 income attributed to real estate multiplied 4.2 times. This is despite the fact that the mortgage interest rate in 1953 was only 84 percent of the 1935 rate (4.8 percent in 1953 and 5.7 in 1935). During this period the value of real estate multiplied 5 times. Of the growth in real estate values from 1935 to 1953, 17 percent was due to the increase in size of farms and 83 percent to the increase in the price of land.

Between 1935 and 1953 income attributed to working capital multiplied 5.1 times. The interest rate on short-time loans in 1953 was only 85 percent of the rate in 1935 (5.5 percent in 1953 and 6.5 percent in 1935). During this period the value of all working capital multiplied 6.0 times. Of the growth in working capital between 1935 and 1953, 40 percent was due to an increase in quantity of assets and 60 percent to increase in price.[12]

Return to Operator and Family for Labor and Management

Returns to operator for labor and management varied considerably from 1935 to 1953. In 1938 they were at a record low; net farm income in that year lacked $800 of paying normal returns to capital. But in 1947 operators of wheat-pea farms in the area received nearly $11,000 for their labor and management after allowing normal imputed charges for capital. This was a record return. In several years, 1942 to 1948, and 1952 and 1953, operators' returns exceeded $5,000. In 1953 gross income had climbed to $23,350; the highest on record. But expenses and capital charges were also at record highs so that net returns to labor and management amounted to $6,500.

Since 1935 the charge for capital has tended to rise even faster than have farm expenses. In general, annual variation in returns to capital is less than variation in farm expenses. Gross income is much more variable (fig. 3). For these reasons, variations in gross

[12] See discussion on valuation and composition of farm assets, p. 16.

income tend to be magnified in returns to operator for labor and management. Most of the differences between 2 successive years in returns to labor and management are caused by corresponding differences in gross income. In 1935–53 the average difference between 2 successive years in returns to labor and management was close to $2,000 per farm. Largely because of a decline in gross income, returns to labor and management in 1949 were $8,000 less than in 1947. The increases in size of farm, capital requirements, and prices that have taken place since 1935 have all contributed to an increase in the financial hazards of farming. An owner-operator who has large debt payments to make from current income is vulnerable to sudden adverse changes in farm incomes. This poses a particularly acute problem for young farmers with limited capital resources who want to get started in farming.

Labor and management returns to wheat-pea farmers have been relatively satisfactory since 1942 as compared to prewar. But a large part of their income has been offset by rising costs for family living. Since 1950 the purchasing power of the dollar has been less than half its purchasing power in 1937–41. Since 1942 the trend in purchasing power of labor income has been downward. The poor crop in 1949 reduced net income while family living costs were rising. Consequently operators had less purchasing power in 1949 than in 1935.

Production and Inputs

Gross production on wheat-pea farms in 1949–53 was 1.4 times as great as in 1935–39. Slightly less than half of this increase was due to an increase in inputs and the rest to increased efficiency. Inputs were relatively constant from 1943 to 1950 and the change in any one year was relatively small. But changes in production from one year to the next were considerable (fig. 5). Most of these differences between successive years are due to variations in crop yields and are mainly independent of farm costs.

In 1953 total cost per farm of all factors—land, labor, machinery, supplies, interest on capital—used in production was $19,200. In 1935 it was $4,400. Appraising the cost of these factors at their average price during 1947–49, the rate of growth in total inputs was more modest—$15,200 in 1953 as compared to $11,400 in 1935. The latter represents physical quantities as price was held constant.

Physical quantities of factors used in production in 1953 were 1.4 times those used in 1935. This rate of growth is approximately the same as the rate of growth in average size of farm, which suggests that the amount of labor and capital used per acre was about the same in 1935 and in 1953. As shown by this report, however, the 1953 farm was not just an enlargement of the 1935 farm. For example, total labor in 1953 was three-fourths of total labor in 1935. But the proportion of non-real-estate capital used in 1953 was double that used in 1935 (table 12).

The rate of growth in size of farm from 1935 to 1953 has been relatively uniform. The decline in amount of labor per farm took place mainly between 1935 and 1946. Since 1946 there has been little

TABLE 12.—*Composition of farm inputs, commercial wheat-pea farms, Washington and Idaho, 1935–53*

Year	Total inputs per farm	Distribution of total inputs					
		Real estate [1]	Other capital [2]	Machinery operation [3]	All labor	Other supplies and services	Total
	1947–49 *dollars*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
1935	11, 428	35	13	6	34	12	100
1936	12, 035	34	16	6	32	12	100
1937	12, 339	33	18	7	30	12	100
1938	12, 889	32	18	7	30	13	100
1939	13, 189	32	19	9	28	12	100
1940	13, 004	33	20	8	28	11	100
1941	13, 179	33	20	8	27	12	100
1942	13, 574	32	20	9	26	13	100
1943	13, 810	32	20	9	25	14	100
1944	13, 343	34	21	9	24	12	100
1945	12, 871	35	22	10	24	9	100
1946	12, 975	36	23	9	23	9	100
1947	13, 680	35	26	9	22	8	100
1948	13, 149	37	25	9	23	6	100
1949	13, 558	37	25	9	22	7	100
1950	13, 480	37	23	10	22	8	100
1951	14, 199	36	25	9	21	9	100
1952	14, 786	35	25	9	21	10	100
1953	15, 233	34	27	9	20	10	100

[1] Depreciation and repair of service buildings and fences, real estate taxes, and interest of real estate capital.

[2] Depreciation and repair of farm machinery, personal property taxes, and interest on working capital.

[3] Cost of operating tractors, implements, farm share of automobile, and trucks. It excludes all repairs.

or no change. But it has continued to be a declining proportion of total inputs because of the growth in size of farm and the increasing use of other factors. Expansion in use of machinery and supplies took place mainly before 1943 and after 1950.

The most striking change in composition of inputs has been the rise in non-real-estate capital. The proportion of inputs coming from capital investments rose from 48 to 61 percent from 1935 to 1953. Inputs from non-real-estate investments, largely machinery and working capital, have increased from less than 15 to more than 25 percent.

The greater capital requirements increase the financial risks that arise from the possibility of price declines. These risks vary by individual farmers, depending upon their tenure and indebtedness.

Appendix

Terms Used

So far as is practicable, the terms used in this report are defined in accordance with standard farm-management terminology. Unfortunately, these terms are not always used to mean exactly the same thing. The terms used in the study reported here were selected and defined to best describe and analyze the data. The following definitions and the illustrations of their use in the income and expense tables (tables 17–19) beginning on page 37 may be helpful in understanding the report:

Total Land per Farm.—All land owned and rented, less that rented out, that is operated and managed as a unit regardless of the amount of field work performed by custom operators or hired labor.

Cropland Harvested.—Acreage harvested is the same as acreage planted, except for winter wheat. The planted acreage of winter wheat may exceed the harvested acreage to the extent of winter killing. The latter is replanted to other crops. No double cropping is recorded. Crops harvested are limited to wheat, oats, barley, peas, grain hay, and alfalfa hay. Some minor crops are combined with the major crop they most nearly resemble. For example, lentils are counted as peas. Other minor crops such as field potatoes are distributed to major crops in proportion to their respective areas.

Cropland.—Consists of harvested acreage, sweetclover for green manure, summer fallow, and both seeded pasture and seeded waterways.

Other Land in Farms.—Consists of the farmstead, garden, roads, and rangelands.

Commercial Family Operated Farms.—All farms in the area that have 100 acres or more of cropland.

Total Labor.—Includes all labor used on the farm, including hired, custom, operator, and unpaid family labor. It excludes the labor of the operator and his family used for personal purposes, such as housework or off-farm work other than exchange labor. It also excludes mechanics and construction labor to the extent that this labor is not part of the regular farm labor force. The operator's time spent in managing and conducting the farm business is included.

Total Value of Investment.—The market value of the farm real estate, livestock, machinery and equipment, a portion of the automobile chargeable to the farm business, and the value of harvested crops in the January 1 inventory.

Cash Receipts.—Include the amount of money received during the calendar year for the sale of crops, livestock, livestock products, and Government payments. All current marketings are included whether the product is produced during the current year or taken from inventories.

Cash Expenditures.—Include the cost of all supplies, hired labor, taxes, other services, and repairs *used* in the calendar year. It also includes the total cost of new machinery, new service buildings and fences *purchased* during the year, as well as the operating cost of the automobile chargeable to the farm business. It includes no charge for use of land other than taxes; nor does it include any interest, installment payments on purchases made in prior years, or repairs on the operator's dwelling.

Net Change in Inventory.—For crops and livestock this is the difference in physical terms between the beginning and ending year inventory at year-end prices. Inventory changes in machinery and service buildings are obtained by subtracting current depreciation from current purchases. Inventory changes for crops and livestock are treated as a receipt while changes in machinery and service buildings are treated as operating expense.

Net Farm Income.—The net cash income plus value of perquisites and net change in inventory. It is the return to operator and unpaid family workers for labor and management plus the return to investment regardless of ownership.

Charge for Real Estate Capital.—The value of all real estate in the farm on January 1 of the current year times the average rate of interest paid by farmers in the area during the current year on farm-mortgage loans.

Charge for Working Capital.—The value of the machinery and equipment, livestock, and crops on the farm January 1, times the average rate of interest paid by farmers in the area during the current year for intermediate and short-term loans.

Return to Operator and Family for Labor and Management.—Obtained by subtracting the assigned charges for real estate and working capital from net farm income.

Gross Farm Income.—The sum of the cash receipts, value of perquisites, and changes in crop and livestock inventories valued at year-end prices.

Gross Farm Production.—The total value at 1947–49 prices of all items sold or used by the farm family, adjusted for changes in the inventory of crops and livestock.

Net Farm Production.—The value of gross farm production at 1947–49 prices minus the value, also at 1947–49 prices, of feed and seed purchased.

Total Production per Unit of Input.—Total value of gross farm production as defined above divided by the value of all inputs at 1947–49 average prices. Included in the inputs are capital charges and value of operator and family labor at hired labor rates.

Total Input per Unit of Production—Reciprocal of total production per unit of input.

Operating Expense per Unit of Production.—Is obtained by dividing total cash expenditures adjusted for inventory changes in machinery, equipment, and service buildings by total value of farm products sold and used in the home adjusted for inventory changes and valued at 1947–49 average prices.

Total Cost per Unit of Production.—Is the same as operating expense per unit of production except that a charge for capital is included and operator and family labor are added at the hired labor rates.

Quantity of Farm Machinery Used.—The value of farm machinery including tractors, trucks, and the farm share of the automobile at 1947–49 average prices.

Index of Prices Received for Products Sold.—This index is based on amount received for the products sold each year relative to value of the same quantities of goods at 1947–49 prices.

Index of Prices Paid for Production Items.—This index is based on cost of goods and services purchased and hired each year compared to cost of the same quantities at 1947–49 prices.

Crop-Yield Index.—The crop-yield index weights the yield of each crop by its average acreage and price per unit of yield in 1947–49.

Additional Tables

TABLE 13.—*Land use, crop yields, and livestock numbers, by size of farm, wheat-pea farms, Washington and Idaho, average 1935–52*

Item	Unit	Size of farm			Area average
		Small	Bulk-line	Large	
Cropland	Acre	175	412	1,082	414
Percentage of cropland in:					
Winter wheat planted	Percent	32.4	34.2	35.1	34.1
Less abandonment	do	−2.0	−2.4	−3.0	−2.6
Winter wheat harvested	do	30.4	31.8	32.1	31.5
Spring wheat	do	5.8	6.1	8.0	6.5
Barley	do	5.5	5.4	5.4	5.6
Oats	do	4.0	3.6	2.9	3.5
Hay	do	6.5	4.5	3.2	4.5
Peas	do	26.1	24.2	22.6	23.9
Total harvested	do	78.3	75.6	74.2	75.5
Green manure	do	5.4	6.9	7.0	6.5
Summer fallow	do	13.0	14.2	16.4	14.9
Cropland pasture	do	3.3	3.3	2.4	3.1
Total cropland	do	100.0	100.0	100.0	100.0
Other land in farms	do	13.5	7.4	5.7	7.7
Total farmland	do	113.5	107.4	105.7	107.7
Crop yields:[1]					
Winter wheat	Bushel	30.4	31.9	32.1	31.6
Spring wheat	do	24.2	25.5	25.3	25.1
Barley	do	34.3	35.5	33.9	34.8
Oats	do	42.0	42.4	38.9	41.6
Hay	Ton	1.7	1.6	1.7	1.7
Peas [2]	Cwt	12.4	12.4	12.8	12.5
Livestock numbers on Jan. 1:		Per 100 acres of cropland			
Milk cows	Head	1.58	0.66	0.35	0.69
Beef cows	do	1.20	.80	.56	.78
Other cattle	do	2.55	1.68	1.23	1.67
Brood sows	do	.88	.47	.29	.47
Other hogs	do	6.37	3.67	2.20	3.59
Chickens	do	54.41	20.45	7.63	21.08

[1] Average of reported yearly yields.
[2] Thresher run uncleaned.

TABLE 14.—*Livestock and livestock products sold and used in the home, commercial wheat-pea farms, Washington and Idaho, averages 1935–49, annual 1951–53*

Item	Unit	Sold or used in the home					
		1935–39	1940–44	1947–49	1951	1952	1953 [1]
Cattle	Cwt	24	47	32	28	19	41
Hogs	do	43	72	26	19	24	16
Butterfat	Pound	639	695	443	473	408	452
Poultry	do	270	315	341	275	319	336
Eggs	Dozen	747	844	627	574	665	615
Value:							
Sales	1947–49 dollars	2, 134	3, 450	1, 670	1, 448	1, 340	1, 639
Consumption	do	501	422	443	430	440	440
Total		2, 635	3, 872	2, 113	1, 878	1, 780	2, 079

[1] Preliminary.

TABLE 15.—*Farm income per farm and per crop acre, by size of farm, wheat-pea farms, Washington and Idaho, averages 1935–52*

Item	Unit	Average			
		1935–39	1940–44	1945–49	1950–52
Small farms—					
Per acre:					
Gross income	Dollar	16. 12	35. 32	44. 25	45. 41
Farm expense	do	9. 23	13. 33	18. 24	21. 53
Net farm income	do	6. 89	21. 99	26. 01	23. 88
Per farm:					
Acreage of cropland	Acre	156. 8	166. 6	186. 4	198. 3
Net income	Dollar	1, 081	3, 664	4, 848	4, 736
Bulk-line farms—					
Per acre:					
Gross income	do	14. 62	32. 87	41. 30	43. 11
Farm expense	do	8. 19	11. 24	13. 54	17. 42
Net farm income	do	6. 43	21. 63	27. 76	25. 69
Per farm:					
Acreage of cropland	Acre	368. 8	398. 2	436. 6	463. 3
Net income	Dollar	2, 371	8, 612	12, 120	11, 901
Large farms—					
Per acre:					
Gross income	do	13. 58	30. 23	39. 35	46. 64
Farm expense	do	6. 42	9. 08	11. 50	15. 33
Net farm income	do	7. 16	21. 15	27. 85	31. 31
Per farm:					
Acreage of cropland	Acre	999. 0	1, 049. 4	1, 003. 2	1, 040. 0
Net income	Dollar	7, 153	22, 194	27, 935	32, 563

TABLE 16.—*Number of tractors and total drawbar horsepower of tractors per farm, by size of wheat-pea farms, Washington and Idaho, 1935–51*

Year	Crawler tractors			Auxiliary tractors			Total drawbar horsepower		
	Small farms	Bulk-line farms	Large farms	Small farms	Bulk-line farms	Large farms	Small farms	Bulk-line farms	Large farms
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*Hp.*	*Hp.*	*Hp.*
1935	0.18	0.42	0.91	0	0	0	4	12	31
1936	.26	.55	1.05	0	0	0	6	16	35
1937	.34	.78	1.14	0	0	.01	8	22	39
1938	.50	.95	1.42	0	.01	.03	12	27	49
1939	.54	1.00	1.46	0	.02	.05	13	29	50
1940	.56	.99	1.53	.01	.04	.08	14	29	53
1941	.70	1.00	1.50	.03	.06	.27	17	30	56
1942	.70	1.02	1.49	.05	.12	.56	18	31	60
1943	.70	1.05	1.54	.07	.19	.79	18	33	66
1944	.71	1.05	1.59	.10	.27	.84	19	34	69
1945	.94	1.05	1.52	.18	.31	.84	26	36	66
1946	.89	1.09	1.55	.18	.34	.84	25	37	67
1947	1.00	1.22	1.64	.18	.44	.84	27	42	70
1948	.98	1.23	1.81	.28	.52	.72	29	44	73
1949	1.00	1.26	1.95	.32	.58	.79	30	46	80
1950	1.04	1.25	1.74	.31	.72	.91	31	49	75
1951	1.00	1.25	1.85	.33	.69	.91	30	49	79

TABLE 17.—*Products sold and used in the home and gross farm income on small and large wheat-pea farms, Washington and Idaho, 1950*

Item	Unit of quantity	Price per unit	Small farms		Large farms	
			Quantity	Value	Quantity	Value
		Dollars		*Dollars*		*Dollars*
Sales:						
Wheat	Bu	1. 89	1, 623	3, 067. 47	12, 848	24, 282. 72
Oats	Bu	. 74	279	206. 46	460	340. 40
Barley	Bu	1. 04	410	426. 40	1, 513	1, 573. 52
Hay	Ton	22. 00	5. 6	123. 20	11. 3	248. 60
Peas	Cwt	2. 57	482	1, 238. 74	2, 253	5, 790. 21
All crops				5, 062. 27		32, 235. 45
Cattle	Cwt	[1] 22. 81	13. 59	309. 99	34. 36	763. 82
Hogs	Cwt	19. 90	8. 38	166. 76	17. 78	353. 82
Poultry	Lb	. 23	382	87. 86	231	53. 13
Butterfat	Lb	. 99	274	271. 26	511	505. 89
Eggs	Doz	. 37	755	279. 35	423	156. 00
All livestock				1, 115. 22		1, 832. 66
Government payments				76. 66		334. 77
Total cash receipts				6, 254. 15		34, 402. 88
Products used in home:						
Beef	Cwt	[1] 22. 81	2. 34	53. 38	5. 08	112. 93
Pork	Cwt	19. 90	2. 64	52. 54	3. 17	63. 08
Poultry	Lb	. 23	118	27. 14	168	38. 64
Butterfat	Lb	. 99	182	180. 18	227	224. 73
Eggs	Doz	. 37	138	51. 06	152	56. 24
Garden				86. 04		74. 54
Net house rent				296. 00		546. 00
Total perquisites				746. 34		1, 116. 16
Inventory change				983. 93		7, 719. 81
Gross income				7, 984. 42		43, 238. 85

[1] For large farms, $22.23.

TABLE 18.—*Expenses on small and large wheat-pea farms, Washington and Idaho, 1950*

Item	Unit of quantity	Price per unit	Small farms		Large farms	
			Quantity	Cost	Quantity	Cost
		Dollars		*Dollars*		*Dollars*
Livestock expense:						
Protein supplement	Cwt	3.62	90.02	325.87	119.29	431.83
Salt and mineral	Cwt	1.86	5.07	9.43	10.58	19.68
Baby chicks	100	19.00	1.33	25.27	.86	16.34
Veterinary and medicine:						
Hogs	Cwt	0.105	15.86	1.67	21.19	2.22
Cattle	A. U	1.05	5.20	5.46	12.2	12.81
Feed grinding	Cwt	.175	102.69	17.97	191.66	33.54
Total				385.67		516.42
Supplies:						
Bags	No	.35	92	32.20	82	28.70
Seeds:						
Sweet clover	Lb	.35	27.2	9.52	639	223.65
Alfalfa	Lb	.69	.7	.48	127	87.63
Grass	Lb	.60	0	0	61.5	36.90
Sodium chlorate	Cwt	12.00	2.48	29.76	9.24	110.88
Nitrate fertilizer (N)	Cwt	16.24	7.64	124.07	59.11	959.95
Gypsum	Ton	15.00	.86	12.90	5.12	76.80
Dusting materials	Cwt	9.00	.36	3.24	1.85	16.65
Seed treatment	Lb	.72	4.38	3.15	23.66	17.04
Fencing	Index [1]	2.17	10.01	21.73	28.97	62.89
2,4-D	Gal	4.53	11.44	51.82	51.34	232.57
Total				288.87		1,853.66
Power and machinery—						
Horse: Veterinary and medicine.	Head	1.05	.4	.42	.2	.21
Tractor purchase:						
Crawlers	Index [2]	2.07	6.44	13.32	447.42	926.16
Wheels	do [2]	2.07	6.33	13.10	6.02	12.46
Tractor operation:						
Gas	Gal	.191	451	86.14	369	70.48
Diesel	Gal	.152	471	71.59	3,710	563.92
Oil	Gal	.75	24	18.00	116	87.00
Grease	Lb	.125	138	17.25	668	83.50
Repairs	Index [3]	1.22	184.98	225.68	996.09	1,215.23
Auto:						
Operation cost	Mile	.039	2,815	109.78	6,929	270.23
Depreciation	Car	1,785	.045	80.32	.055	98.18
Truck:						
Operation cost	Mile	.060	5,702	339.82		
Operation cost	do	.067			10,570	705.33
Purchase	Index [4]	2.44	18.97	46.27	213.27	520.38

See footnote at end of table.

TABLE 18.—*Expenses on small and large wheat-pea farms, Washington and Idaho, 1950*—Continued

Item	Unit of quantity	Price per unit	Small farms		Large farms	
			Quantity	Cost	Quantity	Cost
Power and machinery—Continued		*Dollars*		*Dollars*		*Dollars*
Combine:						
Grain	Acre	1.07	106	113.42		
Grain	do	1.04			591	614.64
Peas	do	1.27	24	30.48		
Peas	do	1.24			127	157.48
Purchase	Index	2.99	85.93	256.93	69.39	207.49
Other machines:						
Repair	Index	1.586	121.79	193.16	259.16	411.02
Purchase	Index [5]	1.586	196.16	311.16	791.55	1,255.41
Net depreciation [6]				157.89		−480.77
Total				2,084.73		6,718.35
Services and buildings:						
Building costs	Index [7]	1.05	187	197.00	511	537.00
Hired labor	Day	9.72	47	456.84		
Hired labor	do	8.26			300	2,478.00
Taxes:						
Real estate	Acre	1.47	226.3	332.66	1,076.9	1,583.04
Personal	Dol	1.16	57.99	67.39		
Personal	Dol	1.13			136.26	154.04
Telephone	Index [8]	1.10	29.63	32.59	57.27	63.00
Electricity	K.w.h.	.016	552	8.83		
Electricity	K.w.h.	.013			1,264	16.43
Total				1,095.31		4,831.51
Total farm expense				3,854.58		13,919.94

[1] Price index (1935–39=100) divided into cost gives the quantity.
[2] Price index (1935 price of a new tractor per horsepower=100) divided into the cost gives the quantity.
[3] Price index (1948 price of a standard hour of labor=100) divided into the cost gives the quantity.
[4] Price index (1935=100) divided into the cost gives the quantity.
[5] Price index (1935=100) divided into cost gives the quantity.
[6] Difference between depreciation and cost of purchases.
[7] Price index (1947–49=100) divided into cost gives the quantity.
[8] Price index (1947–49=100) divided into cost gives the quantity.

TABLE 19.—*Organization, production, costs and returns, commercial wheat-pea farms of Washington and Idaho, 1935–53*

Item	Unit	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953 [1]
Land in farm	Acre	389	401	397	419	421	426	427	426	440	453	444	457	476	474	494	482	498	507	512
Cropland harvested	do	258	261	260	255	262	292	294	322	326	352	346	347	373	311	386	319	325	343	362
Other cropland	do	105	113	110	127	130	105	104	75	83	69	65	77	66	129	70	128	137	127	112
Other land	do	26	27	27	28	29	29	29	29	31	32	33	33	37	34	38	35	36	37	38
Crops harvested:																				
Wheat	do	141	152	152	157	142	133	139	108	85	123	152	172	180	180	214	179	187	242	246
Oats and barley	do	29	26	26	29	40	42	40	46	30	54	41	24	30	35	39	67	41	38	38
Peas	do	67	62	57	54	55	94	96	150	195	159	135	137	147	83	114	53	79	47	59
Hay	do	21	21	25	18	25	23	19	18	16	16	19	14	16	14	18	20	18	16	19
Crop yields per harvested acre:																				
Wheat	Bushel	28.5	28.5	28.4	28.5	30.5	32.8	31.1	33.3	27.6	32.6	34.2	33.8	30.1	29.6	24.3	33.6	32.1	35.3	35.0
Barley	do	35.0	36.5	37.5	34.0	36.0	35.0	35.6	36.3	39.0	37.7	34.9	34.1	34.6	34.7	25.9	31.1	33.3	36.0	31.0
Peas	Cwt	10.9	11.7	15.2	11.1	11.4	7.8	15.6	16.6	14.5	13.3	11.5	16.0	13.1	12.4	9.2	14.1	13.6	12.0	12.5
Livestock on farm, Jan. 1:																				
All cattle	Number	11.9	12.6	12.1	12.7	13.9	15.8	16.9	18.0	19.9	14.1	12.3	10.7	11.3	9.3	9.8	10.4	10.7	11.6	13.8
Milk cows	do	3.3	3.5	3.2	3.2	3.1	3.5	3.3	3.4	3.4	3.4	3.3	2.3	2.1	2.0	2.2	2.2	2.2	1.9	2.1
Chickens	do	87	91	97	97	97	97	97	102	107	113	107	67	61	74	74	69	63	71	68
Pigs raised	do	19	15	20	25	27	26	26	32	45	33	20	19	12	9	14	12	13	12	6
Tractors on farm	do	.40	.52	.68	.87	.92	.95	1.05	1.13	1.22	1.30	1.36	1.46	1.62	1.70	1.79	1.87	1.86	1.86	1.86
Total labor used	Hour	4,120	4,060	3,940	4,070	3,850	3,860	3,750	3,650	3,540	3,310	3,280	3,120	3,220	3,130	3,110	3,140	3,120	3,190	3,190
Operator and family	do	2,160	2,150	2,120	2,120	2,090	2,090	2,060	2,050	2,040	2,000	2,000	1,960	1,980	2,060	1,990	2,000	1,980	2,020	2,010
Hired	do	1,960	1,910	1,820	1,950	1,760	1,770	1,690	1,610	1,500	1,310	1,280	1,160	1,240	1,130	1,120	1,140	1,140	1,170	1,180
Total farm capital, Jan. 1	Dollar	26,110	27,379	31,840	33,680	32,440	35,970	36,529	40,660	50,680	58,130	64,540	75,200	92,200	105,290	112,350	107,620	127,320	136,010	135,350
Land and buildings	do	22,170	22,810	25,980	27,130	26,230	29,060	29,970	31,690	37,950	45,910	51,160	61,530	75,540	85,200	91,740	89,760	106,580	113,570	111,620
Machinery and equipment	do	1,920	2,390	3,160	3,800	3,640	3,610	4,090	4,540	5,240	5,800	6,080	5,840	7,100	8,810	10,250	9,740	10,420	11,400	12,330
Livestock	do	910	1,050	1,080	1,020	980	1,010	1,090	1,510	2,180	1,520	1,340	1,410	1,600	1,700	1,870	1,570	2,170	2,800	2,080
Crops for sale, feed and seed	do	1,110	1,120	1,620	1,730	1,590	2,290	2,330	2,920	5,310	4,900	5,960	6,420	7,960	9,580	8,490	6,550	8,150	8,240	9,320
Total cash receipts	do	5,282	5,433	5,056	3,665	4,967	5,250	9,170	14,575	18,300	15,245	13,765	18,552	23,159	16,190	14,794	14,398	19,215	21,777	21,131
Wheat	do	2,378	2,865	2,539	1,681	2,145	2,151	3,368	2,442	3,153	3,733	6,408	8,252	11,270	8,530	9,234	8,409	12,923	14,788	15,306
Peas	do	1,174	1,161	1,217	619	1,976	1,457	3,449	8,960	11,186	8,293	4,959	7,632	8,295	5,018	3,002	2,873	2,531	3,091	2,814
Other crops	do	144	320	320	244	343	396	563	490	445	920	1,235	987	1,311	1,092	998	1,549	1,933	1,780	1,365
Cattle	do	79	141	102	83	100	194	269	249	923	440	446	283	826	423	384	570	706	359	591
Hogs	do	294	234	359	368	339	285	477	900	1,358	934	577	593	659	414	535	397	356	419	313
Dairy products	do	132	178	163	131	126	178	208	244	289	299	416	352	308	321	300	397	339	277	292
Other livestock and livestock products.	do	173	190	221	188	156	148	203	259	398	332	438	282	286	330	236	204	247	278	265
Other, including Government payments.	do	908	344	144	351	682	411	633	1,010	548	294	186	171	213	62	195	179	180	185	185
Total cash expenditures	do	2,865	3,423	3,470	3,345	3,097	3,612	3,896	4,916	4,938	4,893	4,674	6,093	7,526	7,363	6,462	7,170	8,533	9,753	9,971
Feed purchased	do	197	208	253	226	243	245	283	439	603	498	390	307	361	344	319	336	374	443	382
Livestock expense	do	26	25	26	28	29	36	43	53	63	49	47	42	43	44	49	49	53	56	72
Crop expense	do	293	312	392	496	465	489	503	681	623	601	432	579	579	410	589	654	997	1,056	1,050
Machinery purchased	do	833	1,246	1,120	765	635	884	867	1,011	733	620	719	1,568	2,327	2,115	1,359	1,696	2,542	3,174	3,228
Other machinery expense	do	571	660	762	826	871	939	1,039	1,182	1,292	1,393	1,439	1,482	1,838	1,717	2,033	2,202	2,166	2,256	2,409

Farm buildings and fences	do	138	133	87	118	85	120	205	370	159	275	168	575	676	883	350	354	394	437	441
Labor hired	do	433	518	519	542	480	514	586	803	1,092	1,065	1,092	1,027	1,130	1,220	981	997	1,250	1,485	1,527
Taxes	do	338	285	274	307	313	348	328	344	331	350	353	469	525	581	744	829	704	791	805
Other	do	36	36	37	37	36	37	42	42	42	42	43	44	47	49	47	53	53	55	57
Net cash income	do	2,417	2,010	1,586	320	1,870	1,638	5,274	9,659	13,362	10,352	9,091	12,459	15,633	8,827	8,332	7,228	10,682	12,024	11,160
Value of perquisites	do	313	344	344	308	298	282	341	421	556	543	607	617	858	931	868	838	1,018	1,014	926
Change in inventory:																				
Crops and livestock	do	17	150	428	287	226	274	−350	1,764	−1,809	807	369	394	−2,280	1,004	−431	1,746	−1,258	551	1,252
Machinery and buildings	do	449	690	403	33	−69	165	162	341	−183	−248	−270	811	1,259	925	−334	39	274	621	0
Net farm income	do	3,196	3,194	2,761	948	2,325	2,359	5,427	12,185	11,926	11,545	9,797	14,281	15,470	11,687	8,435	9,851	10,716	14,210	13,338
Charge for capital	do	1,520	1,478	1,700	1,748	1,663	1,815	1,784	1,978	2,408	2,717	3,075	3,664	4,492	5,134	5,404	5,272	6,257	6,685	6,663
Return to operator and family labor.	do	1,676	1,716	1,061	−800	662	544	3,643	10,207	9,518	8,737	6,722	10,617	10,978	6,553	3,031	4,579	4,459	7,525	6,675
Purchasing power in 1937–41 dollars.	do	1,676	1,716	1,030	−816	682	561	3,470	8,506	7,103	6,196	4,573	6,513	5,748	3,244	1,546	2,313	2,064	3,452	3,062
Return per hour in current dollars.	do	.78	.80	.80	−.38	.32	.26	1.77	4.98	4.67	4.37	3.36	5.42	5.54	3.28	1.52	2.29	2.25	3.73	3.32
Index numbers (1947–49=100):																				
Gross farm income	Percent	31	32	32	23	30	32	50	91	93	90	80	107	118	99	83	92	103	127	127
Net farm income	do	27	27	23	8	20	20	46	103	101	97	83	120	130	99	71	83	90	120	112
Net farm production	do	69	75	80	74	79	82	99	116	104	110	108	123	114	94	92	104	102	121	125
Crop yields per acre	do	100	102	110	100	106	104	116	123	107	115	115	123	108	107	85	119	114	119	118
Production per hour of man labor.	do	53	58	64	57	65	67	83	100	92	104	103	124	112	95	93	104	103	120	124
Production per unit of input	do	82	83	89	80	84	87	102	117	104	113	114	127	111	97	92	103	97	110	115
Operating expense per unit of production.	do	52	54	57	66	59	62	56	59	73	70	69	66	84	104	112	105	122	114	121
Total cost per unit of production.	do	47	47	49	54	50	51	46	48	62	63	66	61	81	107	112	101	121	112	114
Power and machinery, Jan. 1	do	43	51	65	73	74	74	77	79	81	88	87	85	92	101	107	100	99	103	109
Prices received for products sold.	do	38	41	39	29	32	35	46	74	82	81	73	87	105	106	89	84	101	106	101
Prices paid, including wages to hired labor.	do	46	46	49	49	48	53	56	64	72	76	78	83	93	102	105	110	117	121	123

[1] Preliminary.

Similar Publications for Other Areas

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COMMERCIAL FAMILY-OPERATED SHEEP RANCHES, NORTHERN GREAT PLAINS REGION, 1930–50, ORGANIZATION, PRODUCTION PRACTICES, COSTS, AND RETURNS. Montana State College, Bozeman, Montana. 1951.

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HOCHMUTH, H. R., AND GOODSELL, WYLIE D.

COMMERCIAL FAMILY-OPERATED SHEEP RANCHES, INTERMOUNTAIN REGION, 1930–50. ORGANIZATION, COSTS, AND RETURNS. U. S. Dept. Agr., Agr. Inform. Bul. 85. 1952.

HOLE, ERLING, AND BONDURANT, JOHN H.

FARMING IN THE BLUEGRASS AREA OF KENTUCKY, OPERATIONS, COSTS, AND RETURNS, 1930–48. Kentucky Agr. Expt. Sta. Bul. 544, 51 pp., illus. 1949.

RAUCHENSTEIN, EMIL, WILCOX, WALTER W., AND SMITH, EDWARD J.

CHANGES IN DAIRY FARMING IN WISCONSIN, 1930–48. Wisconsin Agr. Expt. Sta. Research Bul. 166, 40 pp., illus. 1950.

UNITED STATES BUREAU OF AGRICULTURAL ECONOMICS.

FARM COSTS AND RETURNS, 1945–48, COMMERCIAL FAMILY-OPERATED FARMS IN 7 MAJOR FARMING REGIONS. U. S. Bur. Agr. Econ. 15 pp., illus. 1950.

FARM COSTS AND RETURNS, 1951 WITH COMPARISONS, 20 TYPES OF COMMERCIAL FAMILY-OPERATED FARMS IN 10 MAJOR FARMING REGIONS. U. S. Bur. Agr. Econ. F. M. 93, 21 pp., illus. 1952.

FARM COSTS AND RETURNS, 1952 (WITH COMPARISONS) 20 TYPES OF COMMERCIAL FAMILY-OPERATED FARMS IN 12 MAJOR FARMING REGIONS. U. S. Dept. Agr., Agr. Inform. Bul. 116. 1953.

FARM COSTS AND RETURNS, 1953 (WITH COMPARISONS) COMMERCIAL FAMILY-OPERATED FARMS, BY TYPE, AND LOCATION. U. S. Dept. Agr., Agr. Inform. Bul. 128. 1954.

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